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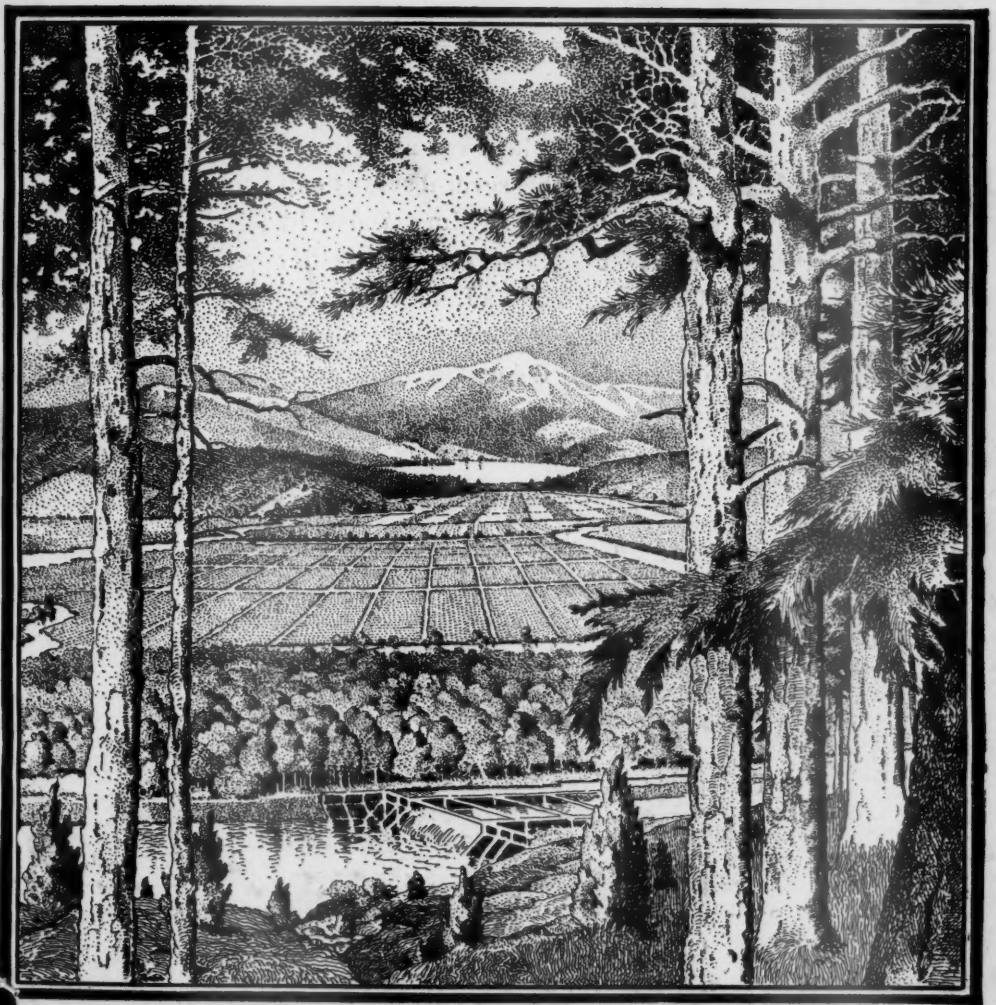

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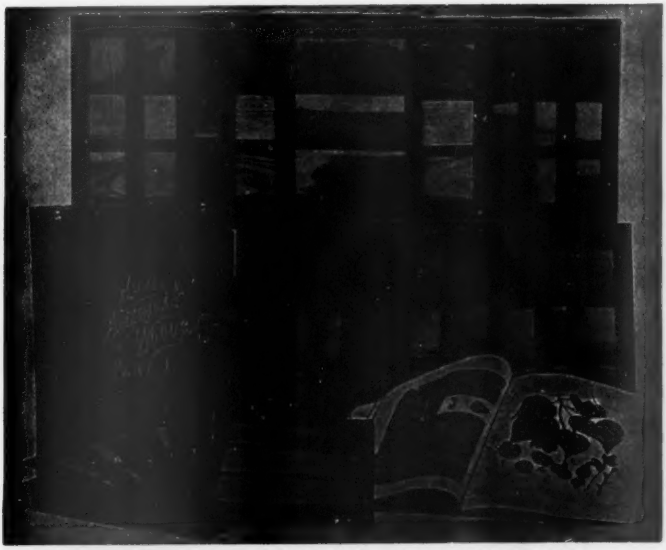

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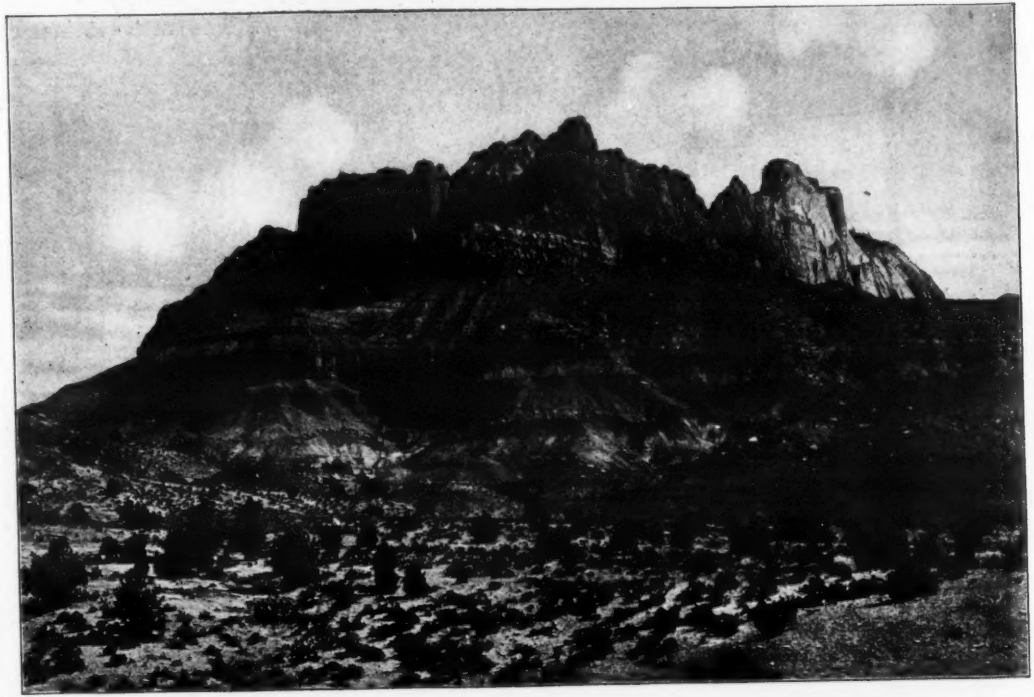


(Courtesy, Office of Experiment Stations, Department of Agriculture.)

A Typical Utah Scene; Steamboat Mountain, Virgin River Watershed.

VOL. XII. OCTOBER, 1906. NO. 10

NEWS AND NOTES

Status of Reclamation Work

The summer campaign of the Reclamation Service is practically over and the organization of field forces is being readjusted to suit the winter work, except in the extreme southern part of the arid region, where climatic conditions favor the continuance of field work throughout the year.

Although but little more than four years have elapsed since the passage of the Reclamation Act, the work has progressed so rapidly that one or more projects are now under way in each arid state and territory, and on fourteen of these projects the work has reached a stage where it is expected water can be supplied to a portion of the lands under them, amounting to nearly 400,000 acres, next season. This means the addition of 5,000 homes to the West, and the return of nearly $1,000,000 per annum to the Reclamation fund to be used over again for the reclamation of more land.

It is not probable that this entire acreage will actually be irrigated next season. Under a few of the projects a small portion of the land is still public domain. In some sections the settlers will not have fulfilled their part of the work by preparing the land to receive the water and constructing the lateral ditches for conveying it over their fields. It is expected, however, that the major portion of this area will receive water from the Government systems in 1907. It is believed that with the practical demonstration which the irrigation of the first units of the projects now under way will furnish by the time the systems reach completion, there will not be an acre of available land under them.

The operations of the Reclamation Act have stimulated development in the West in many lines. Private enterprise is already engaged upon similar irrigation works, and new lines of railroad are extending into the most remote sections of the intermountain country in order to reach the large tracts of land which will support a dense population in a few years. This development has resulted in a woful scarcity of labor, and unceasing efforts are necessary in order that the irrigation works may not be seriously delayed from this cause. Inquiries as to the location of irrigation systems and local conditions are received every

day at the office of the Reclamation Service in Washington, from mechanics, farmers, professional men, and others who desire to locate in the West.

Settlement of Reclaimed Lands

Mr. Morris Bien, Supervising Engineer in charge of land and legal matters in the Reclamation Service, returned recently from an extended trip through the Northwest. He reports that the work of reclamation generally is progressing rapidly and that there seems to be a feeling of optimism among all classes as to the results.

"On the Minidoka project, in southern Idaho," says Mr. Bien, "the land is practically all settled up. Two years ago the Government gave notice that it could not furnish water until the season of 1907, and the promise will be kept. Water will be turned into the canals this fall, and will be furnished to a considerable part of the project next spring.

"One noticeable feature is the unusually permanent and high class character of the buildings that have been erected by the homesteaders. Some of the settlers have been willing to work for the contractors, and in this way have made a good living while waiting for the water. Others have cleared and cultivated small portions of their entries and have raised small crops of wheat and oats of good quality without other watering than the small rainfall during the spring months. Those who have cultivated their ground have managed to realize sufficient return to enable them to make a living. In spite of the opportunities which have thus been developed a large number of the settlers have made no effort to get work or to cultivate the ground, and it may be that many of them will be unable to hold their entries through the next year.

"Those who are clearing their lands and making the necessary preparations for next season's irrigation will undoubtedly be able to make paying crops and will be in a position to meet the charges for the construction work, payable under the Reclamation Act, the first of which will become due at the end of next season.

"The developments on the Minidoka project show very plainly that the supply of settlers for the lands made subject to irrigation under the Reclamation Act is ample, and that the man who is willing to work and goes upon the land in good faith to make a home will, in the course of a few years, find himself the possessor of an extremely valuable tract of land as a result of his efforts."

Pennsylvania Work

Surveyors of the State Forestry Commission have been at work on the lines of what is known as the Englebert tract, in the Lykens Valley of Dauphin County, which has been offered for sale to the State of Pennsylvania as a forest reserve.

It is expected that a report on it will be made before very long, and, if favorable, it may be bought for addition to the 5,000 acres or so which the commission has in the upper part of that county.

The Englebert tract is owned by an estate, and comprises almost 6,000 acres in Jackson, Williams and Wiconisco townships. It is finely wooded and has numerous streams.

It also lies close to the present reserve. The offer of the property to the State was made some weeks ago, and work was promptly started on the surveys.

Organization Meetings

During the past summer the Forest Service has held a number of supervisors' meetings in various sections of the West, for the discussion of the regulations governing reserve business and the business itself. Such meetings have been held in Colorado, Utah, Arizona, Idaho, Oregon, and Colorado. Each has been attended by the supervisors of the surrounding region. In addition, a number of the

Sidehill Construction on the Bear River Canal, Utah.

Section of Turlock Canal, California.

(Courtesy, Office of Experiment Stations, Department of Agriculture.)

VIEWS SHOWING IRRIGATION CONSTRUCTION IN THE WEST

members of the Forest Service from the office at Washington have attended the conference. At the meeting at Boise, Idaho, for instance, there were present, in addition to a dozen supervisors from Idaho, Montana and Wyoming, the Forester, Mr. Gifford Pinchot, Messrs. Sherrard, Potter, Sterling, Hall, and others from the Washington office of the Forest Service.

First of all, these meetings offer an excellent opportunity for reaching a common understanding of the regulations under which the reserves are managed. Second, they bring into evidence the weaknesses of the present system, so that such can be readily remedied. Third, and one of the most important of all, they improve the solidarity of the Service, in that they bring together the office and field force for a common discussion of common questions.

Undoubtedly, by pursuing this policy of getting its men together, the Forest Service will greatly improve its efficiency.

New Massachusetts Forester

Prof. F. William Rane, formerly professor of horticulture and forestry at the New Hampshire State Agricultural College, has recently been appointed State Forester of Massachusetts, vice Mr. Alfred Akermann, who resigned some months ago to accept the chair of forestry at the University of Georgia, endowed by George Foster Peabody. Prof. Rane has been prominent in the forest movement for a number of years, and is particularly conversant with conditions in New England.

Fewer Fires in California

According to *Pacific Coast Iron and Wood* forest fires in California this summer have been few and far between. If this state of affairs continues during the next few months, 1906 will be a record-breaker. Last year was an exceptionally good year in this regard, and did much to prove the benefits of forest reserves.

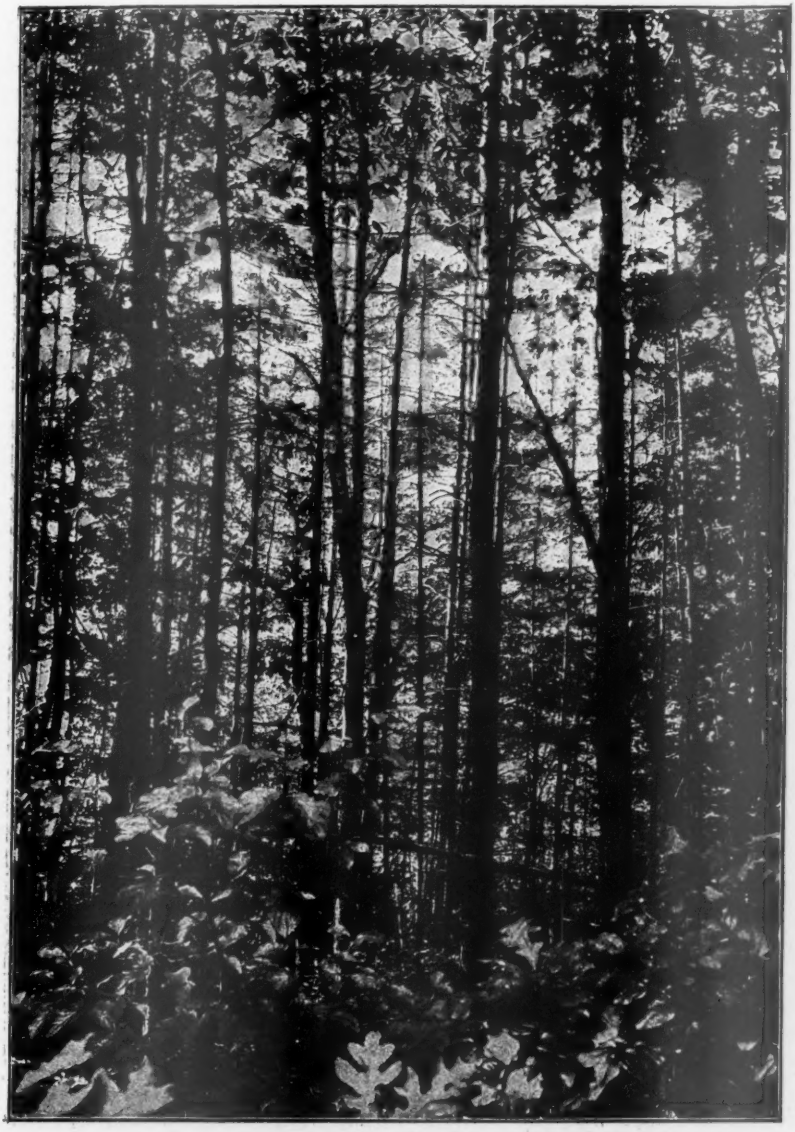
One of the most important factors that substantiate the good of the reserves is the prevention and controlling of forest fires by those employed by the Forest Service, a number of whom have been appointed from California. Every year the forests in many counties are destroyed by fire to the extent of many millions of dollars, and coupled to this is an indirect loss, not to the community, but to the nation at large, which cannot be estimated.

Up to within the past few years, little if anything was done to prevent this wholesale destruction; but since the Forest Service has been created and the forest reserves have been managed and cared for by appropriations from Congress, there has been a great decrease in forest fires and the destruction of much valuable timber.

Canadian Association Meeting

The meeting of the Canadian Forestry Association, held at Vancouver, B. C., September 25 to 27, was largely attended and proved to be one of the most successful of the many interesting meetings of that organization. His Excellency, Earl Grey, Governor-General of Canada, gave significant proof of his interest in forestry by his attendance at all sessions on the opening day, and in addition a large representation of mountain manufacturers were present. Mr. Overton W. Price, Associate Forester, U. S. Forest Service, was present as the representative of President Roosevelt, and addressed the convention on the subject of forest work in the United States. Other speakers at the sessions on September 25 were Lieut. Governor Dunsmuir, and Premier McBride, both of whom spoke upon the necessity for forest education for the people in general. Two papers, by Mr. Judson F. Clark and Mr. Roland D. Craig, respectively, "Forest Revenues and Forest Conservation," and "The Management of Forest Reserves," were read at the Thursday morning session, and evoked much interesting discussion. The resolutions

adopted at the Thursday afternoon session cover a wide range, for the most part petitioning legislative action and asking for more rigid enforcement of existing laws relating to the forests. Special attention is given in the resolutions to the forest fire question, and it is interesting to note, in view of a like resolution passed several times at the meetings of the



White Pine Forest in the Region of the Proposed Southern Appalachian Forest Reserve, Showing Reproduction on Cutover Land. Graham County, North Carolina.

American Forestry Association, that the Canadian organization expresses itself as strongly desirous that forestry be more generally taught in schools and educational institutions.

From this meeting it is manifest that there is a constantly growing interest throughout Canada in forestry and forest conservation. The Canadian Forestry Association is a power for good in the North Country, and the steadily increasing interest its meetings arouse is a significant indication of progress.

Forest Fires in Maine

A correspondent, writing to the *Paper Mill and Wood Pulp News,* gives the cheering information that Maine is getting the forest fire evil under control, and that during the past summer the damage due to fires was small. He says:

"Considering the extremely dry condition of the forests which has prevailed in Maine since early in July, the owners of timber land in the State have been fortunate in escaping with slight losses by forest fires. There have been a number of fires in different sections of the State during this time, but all have been extinguished with slight loss by the fire wardens and the crews employed by the lumbermen, sometimes assisted in the work by timely showers of rain. The danger from forest fires is now almost past. There is still a chance for them, of course, and this is a very bad time of year for a fire to start, owing to the dry leaves on the ground and the withered condition of vegetation in general. The fall rains cannot be a great way off, however, and perhaps before many days the woods will be drenched with rain and all danger of forest fires averted for this year.

"In view of the great expanses of wooded country in Maine and the numbers of campers and fishermen in the woods during the summer it is remarkable that there is not more damage done by forest fires. Every camper and every fisherman is a source of danger. No matter how careful they may be there are still a hundred and one ways in which a fire may start. Nearly all of the men who go into the woods use tobacco, and this means lighted matches, half-burned matches thrown away and, perhaps, live cigar and cigarette stubs thrown into the dry underbrush, any one of which is potent to cause a forest fire.

"The work of discovering and locating forest fires has been greatly simplified by the establishment of observatories on high points in some of the most thickly wooded sections of the State. There are now five of these mountain fire observatories located on Squaw Mountain, Bigelow Mountain, Whitecap Mountain, Spencer Mountain and Attean Mountain. The men at these stations are provided with powerful glasses with which to detect the smoke of a fire many miles away; charts which enable them accurately to place the location of a fire and telephones with which to summon crews to go and fight the fire. All of these stations have records for the discovery of fires, and in many cases the promptness with which they have reported them has been the means of saving the owners of the lands thousand of dollars.

"The appropriation for the warden service and fire protection is altogether too small. It is only $10,000 a year, and $10,000 distributed among eleven counties in which there are valuable timber lands and fire wardens goes mighty quick. That is less than $1,000 to a county, and when it is considered that there are 160 fire wardens, and nearly all have fires to fight and bills of expense coming in at some time during the year one can readily see where $10,000 would be used up in short order.

"It is due Land Agent Ring and his assistants to say that the expenditure is very intelligently made and that the service is remarkably efficient for the comparatively small amount of money appropriated for fire protection."

PERMANENT SAMPLE PLOTS*

BY

ALFRED GASKILL

Civil Engineer, U. S. Forest Service.

IN the press of things to be done for the protection of our forests, and later for their proper utilization, the fundamental principle of the forester's craft has necessarily been sidetracked for a time. Silviculture cannot be practised, of course, until the forest is reasonably secure from destruction, but just as soon as real protection and management begin, thought must be taken for the future. Forestry is more than the preservation of existing forests; it is more than the planting of young trees. It rests upon a knowledge of the habits and requirements of trees in the forest—what is called silvics, and the constant application of that knowledge to every branch of forest work. Lumbering may be carried on "conservatively," planting may be done with greatest care, but unless all be done with some understanding of silviculture (the art of producing and tending a forest) the result is apt to be far from satisfactory.

The practice of silviculture in this country has thus far been based chiefly upon the principles laid down by European authorities. But, unfortunately, those principles are often not so universal as they are claimed to be, and are found not work under all conditions. This brings the American forester to the position of finding out for himself the laws that govern tree development and applying them to the problems that confront him. In other words, the science of silvics and the art of silviculture present at once a great field for original investigation and an opportunity to apply the knowledge that is gained. European foresters recognize the fact that their silviculture is based largely upon empirical knowledge. The best of them are now applying the scientific method and giving the subject a breadth that it has not had. But in the United States, forest problems are more diverse and more compex than they are in Europe. The forests there are simpler (contain fewer species), than ours, unfavorable climatic conditions are less common, and the economic situation permits practises that are not feasible here.

This part of the question admits of no discussion: foresters everywhere concede that what they know of tree growth is limited, and that the time has come to learn definitely and positively the inherent characteristics and requirements of each important species, and, at the same time, to formulate the laws that govern tree associations, that is forests.

As everyone would expect, the Forest Service proposes to take the lead in this work. Many careful studies in all parts of the country will have to be made, and results cannot be expected, in some cases, for years. Nevertheless, the facts that are wanted can be obtained in no other way.

Some of the problems that press for solution are these:

How should a young growth of white pine be treated to produce the lumber of the best grade in the shortest time? There are many stands of second growth in New England to which this applies.

How should a yellow pine forest be cut to insure a good natural reproduction? This applies to many areas now being logged in the South.

What is the best way to handle a mixed hardwood forest so that the more valuable species shall reproduce at the expense of the less valuable?

To what extent can fire be used to help reproduction?

*Photographs through courtesy of U. S. Forest Service.

In the semi-arid regions, what are the relations between moisture deficiency and seed production?

In the same section, The Great Plains, what species are best adapted to planting and what is the proper treatment for each?

What degree of shade does a given species require? How much shade will it tolerate? How do these factors vary with the age of the trees and in different situations? These questions are vital to the production of forests anywhere, whether the seeding be natural or artificial.

What effect has frost upon the development of a plantation and a forest?

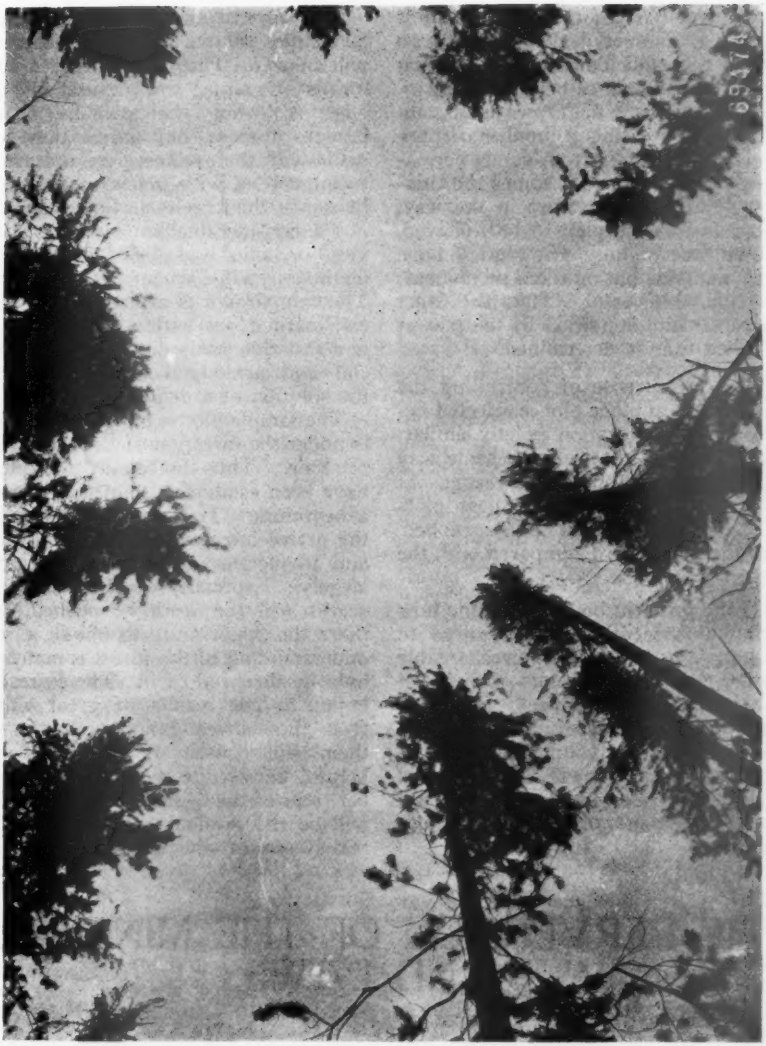
What is the relation of a given species to various soils, aspects, and altitudes?

Broader problems will deal with the possibility of establishing forests where conditions are extremely unfavorable, with the cost and advantage of changing natural types of forest, with the relations that exist between the members of various forest types.

It will not be supposed that work in any direction must halt until each question is answered. Daily work in the forest helps to answer them. Nevertheless, something more is required and the method of sample plots is resorted to. These are called permanent sample plots when they are established and maintained in such a way that every change which takes place within them can be observed and recorded.

Permanent Sample Plot in a Western Yellow Pine Pole Wood to Determine the Effect of Heavy Thinning.

In practise it is necessary to find a place where every condition is as nearly ideal as possible, and to lay off the plot so that everything affecting it shall be entirely normal. The area is usually rather small, rarely more than half an acre, because it is hard to find larger tracts having the necessary unifomity, and hard to control them.



Permanent Sample Plot. Crown Cover in a Stand that has been Heavily Thinned. As the Trees Develop the Crowns Enlarge and Close the Openings.

Suppose the question is, "Will western yellow pine in the pole stage grow enough faster after a heavy thinning to pay for the operation?" A piece of forest is found in which the trees are 4 to 6 inches in diameter and stand very close. In that a half acre is laid off, preferably in the form of a rectangle, and the boundaries are permanently marked. Then the locality is carefully described, and every fact recorded that can have the least bearing upon the forest—altitude, aspect, kind and depth of soil, humus, and ground cover. Next, the forest itself is measured and recorded. Each live tree

forming a part of the main stand is given a number, calipered at two points perpendicular to each other at breast height, and its height measured. The character of the crown is also indicated. After this a number of photographs are taken from points permanently marked. Next comes the thinning. All trees that are in the way, according to the plan to be followed, are cut out. Those that are left have their numbers put on them permanently with white paint. Thus the exact character and condition of the plot at a stated time is determined.

For the purpose of controlling the experiment another plot is selected beside it, or in a location exactly similar, and treated in precisely the same way except that no thinning is made. At intervals of a few years these plots are remeasured and photographed, and the new record compared with the old.

If the problem be to determine how many pine seedlings are required to make a good stand of merchantable timber, several small plots of different densities would be marked off in similar situations, carefully described, and the seedlings counted and photographed. As growth and natural thinning progressed the plots would be recounted and all changes carefully recorded.

The ways of using sample plots are as infinite as the questions that they will answer. They afford the readiest means of gaining any desired knowledge regarding the growth or behavior of trees, but unless they are made with the greatest care and every fact recorded with precision they will be worse than useless. One who has not a considerable knowledge of silvics, or who is satisfied with loose methods, will accomplish nothing. The sample plot is a piece of the forest, marked out within the forest, or in a situation advisedly chosen for special and prolonged observation and the solution of a definite problem.

The sample plot work of the Service is under the direction of Prof. Graves, of Yale. Thus far about 200 plots have been established, but this is only a beginning. It is intended to enlist the active interest of every field man and to increase the number of plots largely. Especially on the forest reserves will the work be pushed, for there the opportunity to obtain a full understanding of the forest is matched only by the need of it. The Forester hopes to get results of great value from these investigations. A part of them will consist of necessary and helpful knowledge regarding the timber trees of the country, a greater part will be the gradual building up of a real system of silviculture.

THE PERVERSION OF THE MINERAL-LAND LAWS

BY

A. C. SHAW
Chief, Section of Claims, U. S. Forest Service.

EACH effort of the Government to prevent the illegal acquisition of its public lands is met by some new device intended to defeat it. The most recent and glaring instance of the ingenuity exercised to this end is the attempted perversion of the mineral-land laws.

The creation of the forest reserves deprived timberland speculators of a most fruitful field of operation. The law authorizing the creation of forest reserves provides for the prospecting, location, and entry of mineral lands within forest reserves. This wise provision of the law is being used as an

instrument for seeking to acquire illegally non-mineral but timbered areas in the forest reserves.

The law permits an association of eight persons to locate 160 acres of public lands after a discovery of mineral sufficiently valuable to justify exploitation as a mine. The same association of persons can locate as many such tracts as they may discover to contain valuable mineral. After a discovery has been made upon the ground the location is made by filing, in the proper recording office in the State where the lands located are situated, a declaration signed by each member of the association of persons. The locators are given by law the right of possession of any lands properly located, and are not compelled to pay for or seek legal title to the lands while they continue to spend the amount required by law ($100 per year) for the actual development of a mine upon each 160 acres.

Until the restrictions upon the speculative acquisition of timbered land had been made by the creation of forest reserves and by the repeal of some of the laws permitting speculative entry, the Department of the Interior did not inquire whether a valid discovery had been made as a basis for a mining location until application was made for a patent conveying legal title from the Government to the locators. Evidence of expenditure was held to justify the conclusion that a valid mineral discovery had been made upon the land for which legal title was sought. Parties desiring to secure timbered lands in forest reserves thought they saw, in these provisions of the law and methods of administration, an opportunity to secure control of and title to large tracts of such lands, and, through pretended discoveries and under the guise of compliance with the mining laws, numerous and large tracts of nonmineral land are being appropriated for some speculative purpose.

In Butte and Plumas Counties, California, is located the Plumas Forest Reserve, withdrawn from entry in 1902 and made a permanent forest reserve in 1905. Because of its heavy growth of sugar and yellow pine timber, its extensive water power, and its probable early railroad facilities within forest reserves, it presented the most tempting field for the development by the speculators of this scheme of acquisition. Its undoubted mineral wealth, shown by past and present mining operations, made the perversion of the mineral land laws the most plausible scheme for acquisition and monopoly of large quantities of timbered land or land surrounding water power, although only a small proportion of such land can be, by any possibility, shown to contain mineral. One party has, with the assistance of seven others, some of whom are in his employ and others under his control, made locations of approximately 280,000 acres of heavily timbered land in this forest reserve.

The suspicion of fraud suggested by their extensive operation may be understood by recalling that the first real mineral land law was enacted in 1866, and since that date there have been sold by the United States under it and the amendatory or enlarging act of 1872, less than 200,000 acres in the entire State of California; less than 300,000 acres in Colorado; less than 150,000 acres in Montana; less than 75,000 acres in Utah; about 50,000 acres in each of the States of Oregon and Idaho, and less than 40,000 acres in Nevada, New Mexico, Washington, and Wyoming, respectively.

The lands in the Plumas Forest Reserve covered by the locations referred to have been subject to mineral entry since the enactment of the mineral-land laws, and the lands located are interspersed with mines practically all of which have been abandoned. The locations have been distributed throughout the years 1902 to 1905, inclusive, but no mining has been done upon them. The locators are not miners and the selections were made by timber experts. It seems probable that one of the prime objects of these locations was to protect a proposed

right of way for a transcontinental railroad, which is now in course of construction across the forest reserve and across many of the locations. The controlling locator was connected with the railroad when the locations were made and assigned the right of way to it. When the construction of this railroad is completed there will be a public demand for the matured timber.

Another man claims approximately 20,000 acres of land in the reserve under mining locations made in similar manner, and for the apparent purpose of enabling him to monopolize the most desirable and valuable water power.

Following its policy to make the forest reserves contribute to the development of the sections of country in which they are located and to supply the sectional timber demand, and to prevent monopoly of the resources of the forest reserves, the Forest Service found it necessary to take steps to annul such locations as are clearly illegal. In a mineralized section, as parts of the Plumas Forest Reserve undoubtedly are, injustice and harm to actual miners and actual mining development can be avoided only by the most conservative action.

At the request of the Forester, the Secretary of Agriculture laid the situation in the Plumas Forest Reserve before the Secretary of the Interior. The latter has determined that his Department has legal power to determine the validity of a location before the locator files application for patent in the land department. A corps of geologists has been detailed by the Secretary of the Interior to examine the ground embraced in the locations to determine whether or not a proper discovery had been made and whether or not the requisite amount of development is being done. The evidence gathered by these geologists will be made the basis of a hearing before the land department, and any locations found illegal will be declared invalid. It is to the interest of legitimate prospectors and miners to support the efforts of the Government to prevent one person or set of persons from appropriating vast quantities of land under pretended color but really in defiance of the mineral-land laws. The resources of the forest reserve are open at all times to persons actually prospecting or developing mines, and forest officers are instructed to encourage, assist, and protect actual mining.

Wholesale and illegal mining locations not only cloud the title of the Government and prevent the public sale of matured timber from forest reserves, but they encourage monopoly of resources which could be most naturally and beneficially developed by varied interests. These locations also retard legitimate mineral development, since they make it necessary for legitimate miners, desiring to locate and actually develop any of this land, to prosecute extensive contests against illegal claimants. By illegal locations which have not been regularly brought before the Department of the Interior, legitimate development and use of the public land is discouraged. Stock companies, based upon fraudulent mineral land locations, are formed and stock sold to innocent persons, who are unaware of its illegal basis. The situation of the Plumas Forest Reserve is duplicated upon surveyed, and especially upon unsurveyed, public land not in forest reserves, and the action which is being taken in that reserve will be followed by similar action in others, and legitimate claimants to unreserved public land also may hope to secure the annulment of illegal mining claims for such land, and its subjection to a proper and legal use. The mineral-land laws undoubtedly have certain defects and were enacted under conditions which have changed, or to some extent disappeared, but they were always intended to foster legitimate mining developments, and to provide for perfection of title under legal discovery only. As has been found with others of the public land laws, the executive officers have been given ample opportunity to detect and prevent fraudulent and illegal acquisition of public lands. A

vigorous execution of the present law will protect the public domain and the legitimate miner. The co-operative investigation on mineral-land claims by the Departments of the Interior and of Agriculture, now in operation, insure such execution.

When it has been found that a cloud has been fraudulently placed on the Government's title to the public land, the persons responsible should be held liable for the expense which their illegal efforts has forced the Government to incur.

FOREST RESOURCES AND THE PUBLIC WELFARE

An Address Made Before the Annual Kentucky State Development Convention, Winchester, Kentucky, October 12, 1906

BY

HERBERT A. SMITH

Editor, U. S. Forest Service

WE have lately passed through a half century of industrial development almost unparalleled in human history. In 1850 our population was 23,000,000, in 1900, 76,000,000. In 1850 our farm acreage was less than 300,000,000, in 1900 over 800,000,000 while the value of our farm property was less than $4,000,000,000 as against over $20,000,000,000 at the latter period. Our manufactures make a still more remarkable showing. The wage earners employed have risen from one to five millions, while the capital invested multiplied twenty times in the half century—from $500,000,000 to nearly $10,000,000,000. It is chiefly within this half century that our railroads have spread their network over the land, and steam has revolutionized the whole world of industry. In brief, then, these fifty years have seen an immense expansion of agriculture coupled with the sudden growth of a colossal manufacturing interest, and naturally along with these an accompanying development of transportation.

Who can doubt as we seek to read the future in the light of the present, that the first half of the twentieth century will see a progress equally notable. By 1950 we bid fair to be a nation of 200,000,000 souls. We have covered the land with our farms, yet it is now apparent that we have no more than scratched the surface of its productive power. By the use of irrigation we may plant empires in the desert, while by improved methods of cultivation we have it in our reach to increase the yield of our present farms many fold. Our manufactures are still increasing at a rate that staggers the imagination to keep pace with, and instead of having to supply our needs from other countries we are invading the markets of the world. Electricity promises to rival in the next half century the marvels which steam wrought in the last, while our vast supplies of iron and coal, the two main pillars of present-day industrial supremacy, insures us such an immediate future as no other nation can hope to rival.

Yet there is another class of considerations which demands our attention. One of our most sagacious men of affairs has lately been calling to our notice the danger of exhaustion of many of our resources upon which prosperity depends. The very rapidity of national growth of which we

are assured—which we can not escape—enhances the danger. By the end of the half century our vast deposits of iron will (so it is said,) under the accelerated drain, have been very largely reduced. Our dwindling forests have already begun to harm the industries dependent on them Our coal, the chief source of the power which drives the wheels of industry, can never be burned but once. Can it be that the vast rising structure of our industrial life is consuming its own foundations and is doomed to eventual downfall?

That same sagacious man of affairs to whom I have just referred—Mr. James J. Hill—has pointed out the distinction between our lasting and our transitory sources of prosperity. Our farms belong in the first class; our mines in the second. Every ton of ore taken from our mines is like money drawn from a bank account; when it is used it is gone. For stable and permanent prosperity, if our national greatness is not to fall into an early decay, we must look to those sources of wealth which are capable of utilization without impairment of their productive power.

There is a fundamental difference between utilization and exploitation. Mere exploitation brings temporary enrichment followed by permanent impoverishment. Exploitation is too often regarded as development. True and lasting material development depends on our learning to make the most of every natural resource. Undeveloped, our resources are but potential wealth. The greatness, prosperity, and power of our country, and with them our own individual welfare, depend on our learning how to utilize to the fullest every natural resource.

Of these natural resources our forests constitute one of the greatest. Hitherto we have abused this resource shamefully. We have exploited it. With the prodigal recklessness born of abundance we have taken what we needed and destroyed much more than we have used. It is now plain that the day of reckoning is not far distant. Not our children, but we ourselves, are likely to have brought forcibly home to us the evil consequence of our shortsightedness.

In this problem forestry plays an important part. A considerable portion of our land is by nature fitted to serve its best use as a source of permanent supply of wood and water. In mountainous regions wood is the only crop which the soil is capable of producing, but it is not merely in the mountains that the natural forest land is to be found, Even in our richest agricultural regions there is usually to be found more or less land too rugged, steep, wet, or infertile for agriculture. Eventually the woodlots of the American farmer will furnish us with a large part of our wood supply.

The Department of Agriculture exists at Washington to promote the best use of all kinds and classes of the land which forms our greatest national asset. The problem is essentially the application of the highest intelligence and fullest scientific knowledge to the work of making our land yield its utmost. The Department of Agriculture seeks for the farmer new crops, better seed, better methods of cultivation, improved methods of breeding and caring for stock, information as to how to market his product—whatever can make his farm more profitable. In doing this it is adding enormously to the capital value of farm lands.

It is no new statement, but yet it is one that can not be made too often, that wood is of basic importance in our industrial life. Other materials can not do away with the need of it. There is no great industry for which it is not important.

Take the case of Kentucky. More than one-half of her area is wooded. Lumbering adds yearly to the wealth of the state an amount which places it second among her great industries. Yet this is only a beginning. Kentucky is rich in coal, but coal can not

be mined without a large supply of mining timbers. In many places the coal mines have already largely drained their supply of timber, and the management of Cumberland Mountain forests for the production of such timber will probably furnish their best employment, and will be necessary in the interest of the mines themselves. The same thing is true of the railroads. Every tie laid in the track requires on the average two trees growing in the forest to keep it there. Through the northern part of the state the production of railroad ties from timber tracts and woodlots will assuredly be one of the most profitable ways of utilizing the forest, and special studies along these two lines, mining timber and tie production, in these two different parts of the state, would therefore be of great value. By far the greater part of the lumber produced in Kentucky is hardwood, of which oak constitutes a large part. Upon the supply of this depend many industries. Distributed through the state are to be found vehicle factories, handle factories, tight and slack cooperage plants, box factories, veneer mills, and wood distillation plants. The manufacture of carriages and wagons alone represents an aggregate investment of over $4,000,000. The cooperage industry in Kentucky produces more tight barrel stock than any other state in the Union.

Forest destruction is already threatening the future of these industries. Recent reports from the National Tight Barrel Stave Manufacturers' Association show that their timber to-day is costing nearly four and a half times what it did 10 years ago. The handle factories of Kentucky use large quantities of hickory. Only this week the papers announced that the scarcity of hickory timber was the chief subject of discussion at the opening of the annual convention of the National Association of Implement and Vehicle Manufacturers. These manufacturers see the need of the supply of hickory already in sight.

Industrial development throughout the South is now recognizedly dependent in large measure on the development of the water power furnished by the streams descending from the Southern Appalachians. Forest destruction has already sensibly begun to affect these water powers. A measure to establish a national forest reserve which will put a stop to this destruction and benefit at once the consumers of wood, the users of water power, the agricultural interests affected by the floods in nudation, and the harbors and navigable inland waters now injured by the deposits of silt and sandbars, was passed by one branch of Congress at its last session and now awaits the action of the other branch. From the Forester's standpoint there can be no question that this legislation, if enacted, will beneficially affect the development of every state which borders on the reserve. It is to be hoped that this reserve will include some part of Kentucky.

But the state needs more than action by the National Government. If her forests are to play their proper part in contributing to her welfare, the private owner must be informed before it is too late how to make the most of what he has. The forests must not be left to take care of themselves. Trees are a crop as truly as corn and tobacco, and must be cultivated by the methods which will bring the largest yield. Of these methods the ordinary owner, particularly the small owner, is ignorant. He is ignorant also of how to dispose of his property to the best advantage. The large owner can generally be depended upon to take care of himself. A wise state forest policy might well begin with a study of existing forest conditions and existing markets, which would throw light on the important problems of management. Such studies have already been made in other states, notably New Hampshire and California, in co-operation with the Forest Service of the National Government, which stands ready to co-operate with any state by sending

its experts to conduct such a study. After the study is made the way is clear for full formulation of the policy which will best serve the interests of the state.

The last resort, public opinion, the intelligent interest of the citizens, is the force which, if brought to bear, will work the greatest good for the forests of Kentucky. To inform and strengthen this interest in forest problems every channel of information should be opened.

This campaign of education is needed to secure certain definite, practical results. The essence of the matter lies in a nutshell. Over one-half of Kentucky is wooded, and most of this land can have no permanent value except to produce wood, which the manufacturing interests of the State cannot do without.

The question is, shall much of the State be permitted to become waste and worse than waste land, untaxable, stripped and abandoned and pouring down ruin from its gullied and washing slopes, and shall much more produce only a scant and inferior yield of material worth less for the woodworking industries and hardly worth cutting, or shall every acre of the commonwealth contribute its share to the general welfare and its full profit to the owner, yielding its present harvest of mature timber without injury to the younger growth, and intelligently directed to the production in largest possible quantity of the best paying and most needed kinds of wood?

THE DINKEY GROVE OF BIGTREES*

One of the Little Known Groves of Sequoias

BY

JOHN D. GUTHRIE

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ONE of the smallest, most isolated, and least known of the ten groves of big trees in the state of California is the Dinkey Grove of Fresno County. There is practically no published information in regard to it beyond being included in a list of bigtree groves in "A Short Account of the Big trees of California," Bulletin No. 28, of the Forest Service, with the comment that very little reliable information was obtainable in regard to it, and that it was said to have been discovered by two hunters in the early seventies. The grove has been given the name of "McKinley Grove" by the U. S. Geological Survey engineers when they made a contour map of this region a few years ago, but the grove is still locally known as the Dinkey Grove.

The grove is located in Section 35, Township 10, South, Range 26, East, on a small stream emptying into Dinkey Creek, a tributary of Kings River. It is situated within the Sierra Forest Reserve and is under Government ownership. The grove, though small, is the only one to be found between the Fresno Grove in Madera County and the Tule River Grove in Tulare County, and is the only Government-owned grove between the Sequoia National Park and the Mariposa Grove, and the interest manifested in it by residents throughout that region is considerable. As an evidence of this interest it may be said that during the four days spent by the writer within the grove it was visited by over thirty persons, The grove may be reached by the stage from the town of Fresno to Ockenden post office. From here a road leads to Dinkey Meadows, from which point a good trail is found to the grove.

The grove is situated in a slight depression, on a bench, on the south-

*Illustrations through courtesy of U. S. Forest Service.

east slope of a ridge, having an elevation from 6,800 to 7,300 feet above sea level. The total number of Sequoias in the grove was found to be 170, and these are scattered irregularly along the gentle slopes on either side of the small streams flowing through the grove, the entire grove covering an area of some 50 acres. The stand is composed almost entirely of large, old sequoias; only in three restricted localities is any young growth to be found and this ranges from seedlings a few inches in height to pole growth with diameters of 8 to 18 inches. The large sequoias are found as single trees, in twos, or in groups of three or more. In one case a group of seven large trees is found growing very near together and the group has been named "The Pleiades."

Reproduction of Bigtrees, Averaging 3 feet tall and 15 years old. Grown up after Fire. Dinkey Bigtree Grove, Sierra Forest Reserve, California.

With the bigtrees, forming an understory, is found a large quantity of sugar and jeffrey pine, white fir and a small quantity of incense cedar, ranging in height from 100 feet to 150 feet. The density of this growth, together with the intolerance of the bigtree, is the cause of the scarcity of sequoia reproduction within the grove. This was clearly shown in one locality where a fire had destroyed the fir and pine on an area of a few square rods and here, on a plat 16½ feet square, 550 sequoia seedlings were counted, from two inches to one foot in height. Two other patches of sequoia young growth were found, one of sapling growth from 4 to 15 feet in height, scattered among a fairly dense cover of chaparral, but overtopping it and making good growth. The other locality contained much larger growth, from 6 to 20 inches in diameter. In all three cases these stands were found in small openings among the fir and pine.

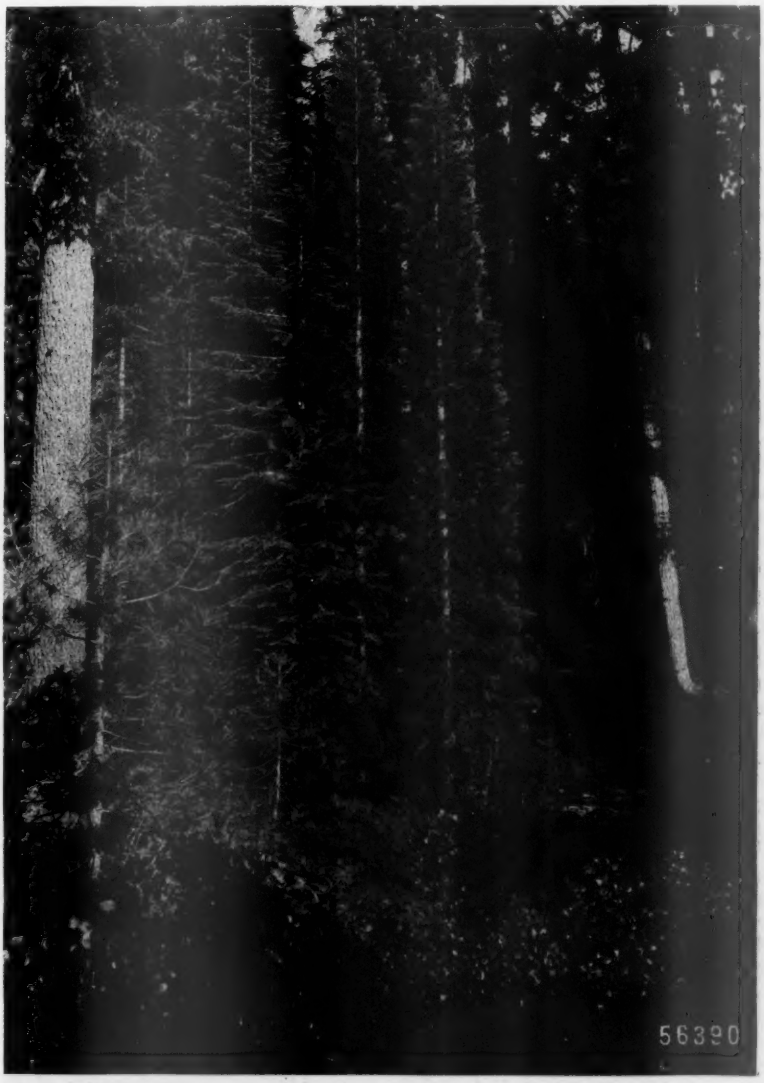
Seed of the bigtree in this grove seems to be borne in abundance, judging from the large number of cones beneath the trees, but, owing to the heavy litter on the ground and the shade of fir and pine, the species can succeed in germinating and getting started only in the very few, small, open spots within the grove. On the

other hand, the reproduction of white fir and pine is good throughout the grove.

Undoubtedly the original stand in the grove was of sequoia; the white fir, sugar and jeffrey pines have succeeded in getting a footing and are slowly crowding out the sequoia and will eventually form the stand unless something is done to bring about conditions suitable for the natural restocking of the bigtree. This could be accomplished by cutting, to a large extent, the fir and pine in the grove, thereby opening up the stand and letting in more light, which is essential for the growth of the bigtree. The large specimens of the sequoia are in

Two Pole Bigtrees of Fine Growth in Dinkey Grove.

many cases on the decline, as is shown by the stagheaded condition of the tops. Old fires have injured many of them very severely, but, if the natural records are to be believed, there seem to have been no large fires within the grove since 1876, which date is plainly legible, carved on the trunk of the largest tree in the grove, known as "General Washington." There have been small fires, notably one about fifteen years ago, which killed a large sequoia, the hollow shell of which now remains and around which some young



Two Fine Young Sapling Sequoias, Growing in an Opening Along the Bank of a Creek Flowing Through the Dinkey Bigtree Grove.

growth has started (see illustration). There is a forest reserve rule against camping or building fires within the grove, but owing to the large amount of territory to be covered by the forest rangers this rule cannot always be enforced, as it would be impossible for them to keep a close watch over the grove.

"General Washington," the monarch of the grove, has a diameter of 21 feet at a point seven feet from the base and has been severely burned by several fires in the remote past. Other large specimens in the grove are "Old Defiance," with a diameter of 17 feet, eight feet above the base; "Fresno," with a diameter of 18 feet, eight feet above the base, a clear length of 74 feet and a height of 243 feet, (has been injured by fire); "The King's Throne," 16 feet in diameter at breast height, has clear length of 105 feet and a height of 264 feet. Many of the largest trees have placards on their trunks bearing names, such as: "James R. Monroe," "The Lady Laura," "The Lady Bertha," "Ruth Cleveland," etc.

WORK OF THE AMERICAN FORESTRY ASSOCIATION

BY

THOMAS ELMER WILL
Secretary of the American Forestry Association.

If the American forests are to be saved, the work must be done by human agencies. Of these, the chief are two in number, the Forest Service and The American Forestry Association. The first is public, governmental; the second, private and voluntary.

That two such forces should exist is well. What is impracticable for government is often entirely within the scope of private initiative; while tasks before which private efforts fail may be easily attained by an entire people co-operating through the central organ they, for convenience, designate as their "Government".

With a new and fitting name, and with field and powers vastly enlarged, the Forest Service is striding forward in seven-league boots in the performance of a task essential to the Nation's life. Yet "Government" cannot do all. No stream can rise higher than its source; neither can a government—especially a popular government—long maintain a policy not favored by the people. For this reason, if the Forest Service is most truly and fully to perform its function it must constantly feel that it is standing upon the solid rock of an approving public sentiment.

The chief agency for developing and educating this sentiment should, naturally, be a voluntary organization, composed of those in sympathy with the end sought. Such an organization is the American Forestry Association. During its life of twenty-four years it has stood at the forefront of the Forestry Movement, holding meetings, distributing literature, diffusing intelligence, arousing interest and pressing for needed legislation.

Within recent months a special effort has been made to increase the membership of the Association. Members include annual or active, sustaining, and life, and, also, patrons. Active and sustaining members pay, respectively, $2 and $25 per annum. Life members and patrons pay, respectively, $100 and $1,000 each, once for all.

The chief income of the Association is derived from payments by members; an additional source consists of direct

contributions; these, however, are few.

The great work immediately ahead of the Association is the passage of the bill establishing the Southern Appalachian and White Mountain forest reserves. In the last session of Congress, this bill passed the Senate and was favorably reported from Committee in the House. It is understood that a clear majority of the members of the House favor its passage. What now remains is to provide the opportunity for the members to vote upon it. This opportunity is controlled, nominally, by the House Committee on Rules; actually, by the Speaker. If the latter can be induced to permit the bill to come to a vote its passage is practically assured. The Association will exert itself in the coming session to effect this end.

Just beyond, however, lie other worlds to conquer. Desirable as is the White Mountain and Appalachian bill, it is for the East but a beginning. "Reserves," unhappily so called, now dot the western mountain regions. They should, likewise, abound in the east. As President Roosevelt well declared at Raleigh, "All the higher Appalachians should be reserved, either by the states or by the Nation;" and he wisely added his express preference that "they should be put under National control." This foreshadows a long and arduous campaign.

Further, the work of extending the reserve system in the west should be continued. More reserves are needed, not only in the mountains, but in the semi-arid region. A beginning has been made, as in the Dismal River region of Nebraska and at Garden City, Kansas, where federal tree planting is in progress. A vast work, however, remains to be done in all this area.

Friends of the forest, rally to the standard! If not already members, join the American Forestry Association. Aid it by your dues and by your influence. If members, present the needs of the work to your friends. Distribute its literature. Point out the need of active, intelligent, organized effort. Swell the rising tide of sentiment, which alone can save our forests from the despoiling hand of the exploiter and transmit to our children the heritage which is rightfully theirs.

IRRIGATION LEGISLATION IN THE WEST

BY

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THERE is much activity at the present time in the States of Montana, Oregon, and Washington, with a view to securing legislation on the subject of water rights and irrigation from the legislatures of those States during the coming winter.

This subject has received much attention during the last few years in the western States, and in several States a considerable advance was made in the legal conditions upon which the use of water will depend.

Until the passage of the Reclamation Act, four years ago, the Federal Government did not come into direct contact with the laws of the States upon this subject, but since the United States has begun the construction of irrigation systems in a number of the western States, the necessity of definite action to improve the legal condi-

tions which hampered speedy and secure investment by the United States, was impressed upon the attention of the legislatures of the States. The message of President Roosevelt at the beginning of the Congressional session in which the Reclamation Act was passed, had forcibly presented the unsatisfactory conditions in some of the States.

This message was doubtless the first Presidential message to Congress containing a discussion of the state laws relating to irrigation. In a few incisive paragraphs, President Roosevelt stated the fundamental principles which should underlie such legislation and pointed out the fact that in a number of States decisive action was necessary in order to place their laws upon a proper basis.

It is true that a modification of the irrigation laws would eventually have been compelled by the force of circumstances. But there can be no doubt that this vigorous discussion by the President and the passage of the Reclamation Act, which is also due largely to his efforts, has caused these changes to be made in several States much earlier than if the necessity had not been so presented by the President's energetic statement.

The fundamental ideas are that the waters of the western streams are of but little value while they flow in the streams, and that most of the lands now belonging to the public are of no value without the application of the water. Separately the two are of no benefit to the country or to civilization, while if the water is brought upon the land, the development of a magnificent civilization upon the former desert becomes possible.

In several of the States of the West the legal conditions have interfered seriously with the bringing together of the land and the water. This situation was recognized and many efforts were made from time to time to secure the necessary modification of existing legislation, or further legislation to meet the inadequacy of the existing statutes.

This need has been felt especially in the States of Montana, Oregon, and Washington, and vigorous efforts two years ago secured special legislation to facilitate the operations of the Government in those States. This has been of some value, but the work of the Government must remain hampered by the statutory conditions upon this subject, so long as no general system is in force in harmony with the principles recognized as necessary by modern practice.

Immediately after the passage of the Reclamation Act, surveys and investigations were commenced by the United States, with a view to the construction of irrigation works in the various States and Territories mentioned in the law. Prior to the legislative sessions of 1903, the Reclamation Service was asked to suggest legislation in order to meet the obstacles found in some of the States on account of the existing laws concerning water rights and irrigation.

It was felt, however, by the officers of the Service that there had not been sufficient practical experience to warrant any suggestion upon this question. Two years ago, however, preceding the legislative sessions of 1905 in the various States, in reponse to urgent requests from representative bodies in several of the States, particularly in Washington and Oregon, a draft of a State irrigation code was prepared by the Reclamation Service as a suggestion to the commissions engaged in preparing recommendations for the legislatures.

This draft was carefully considered in a number of the States and Territories and was adopted without substantial change in the States of North and South Dakota and in the Territory of Oklahoma. In Oregon, Washington, Montana, New Mexico, and others some features of this draft were adopted.

There is now a renewal of interest in this matter and commissions in Montana, Oregon, and Washington are again considering the proper form

of recommendations to be laid before their Legislatures at the next session.

It is to be hoped that definite progress may be made in each of these States, for it will not only facilitate the work of the Government, but will also open the way for the more secure investment of private capital in the development of irrigation works in all these States.

Legislation which will enable the claimants to the use of water to make their rights as definite and certain as the right to the ownership of land, cannot fail to encourage the investment of private capital, which has been more or less timid in the past of the difficulty in determining accurately the extent and nature of the rights to the use of water upon which enterprises for irrigation, water power development, etc., must necessarily depend.

The commissions engaged upon this work are composed of men standing high in the community as irrigators, business men, and lawyers and they can do no greater service to the State than to aid in securing improvement in irrigation and water right legislation.

RECREATION AND THE FOREST

MEN work that they may enjoy leisure, and make money in order to spend it. This is not, perhaps, the normal and proper state of affairs, and it may be that work for its own sake should bring rewarding enjoyment. But as the world goes, work may mean overwork, or work without real choice or aptitude, so that what might otherwise be a pleasure is too often a dry task. Recreation, therefore, though it takes up but a short span in the course of a lifetime, is cherished in proportion to its brevity. If the world had no natural recreation grounds the ordinary man would lack incentive to labor except to supply the bare needs of existence. For the play instinct, the delight in free activity for its own sake, especially in the great outdoors, is as old as the race and one of its best inheritances from its prehistoric ancestry.

The forest is the most ancient and momentous of human dwelling places. Ever since men, in caves and trees, learned, even among dangers, to regard the forest as a home, the shadows, the silence, the excitements, and the fascination of the forest have stirred the strongest feelings of the race. Dread of the forest, its incentive to achievements, the sense that within it all things good and evil were to be found and treasured or encountered and overcome, have left an indelible impress in the minds and hearts of men.

In primitive days, when the business and risks of life were over for the day, the stern and impressive realities could be rehearsed by the hunter and his children in the mimic world of play. Nowadays, the ordeals of our forest ancestors have become all play. Hunting, picnicking, canoeing, fishing, tramping, the tent life and the roaring camp fire, are all survivals of the life of the Forest Age, reminiscences coursing in the very blood of our civilization and carrying us back to the times when danger was a part of the day's work and successful craft against bird and beast and fish was the first condition of existence. Recreation in the forest is the pleasant recall, in imagination, of a life vivid, fresh, free, and heroic. This life, now lost to us in the humdrum barter of the market place, may be brought back by the power of money, to amuse and invigorate and thrill us yet in our short hours of leisure and liberty.

How highly this reversion to the old life is treasured may appropriately be measured, in these times, by the sacrifices men make, the money they

spend, for a summers outing beside forest and stream. In New Hampshire, for instance, about half a million dollars are spent each year by the summer visitors, whose choice of this region is based upon its fine woodlands and lakes. Of the 174,280 persons spending their summer there, in the latest year for which figures are at hand, only about one-tenth (20,352) occupied cottages for the season, while a third remained but a week or so, and more than half (95,706) remained less than a single week. The cash received from these people, in the same year, was almost $5,000,000, and the total amount of this business added to the capital invested in summer resort property exceeded $10,000,000.

Had the forests been destroyed or disfigured by wasteful logging, probably not one cent of this large income to the state would ever have been spent. Common sense, not sentiment, must make the strongest protest against any use of the New Hampshire forests, save one consistent with retaining forever the attractive power of the whole region for those seeking recreation. Of course, this "summer people" revenue is only a subsidiary affair in a business sense. The forests are chiefly valuable there, as elsewhere, for their ability to supply use and profit in the concrete of wood products. But the two values, the commercial and the pleasurable, may be secured together. The farmer whose yearly income is greatly augmented by the recreation his guests are sure to find in the forest which he owns, need not withhold the ax altogether. His woodlot may be made to pay by oft-repeated cuttings which yield wood for home use or for market, without so thinning the stand as to mar the shade or pleasantness of the picnic grounds. Besides, by clearing the woodlot, though the first returns would be greater, he would have to wait long for further revenue; not only would he, in effect, turn away the paying guest, but he would discount the future.

Rules for the farmer's woodlot management in this region would be to avoid cutting of any kind during the summer outing season, to have strips of woods along the roads, to leave undisturbed the favored picnic grounds or places of special interest, and, in general, to avoid as far as possible, the clear cutting of any tract.

The same principles hold true even more emphatically of larger lumbering operations. These should go on; they yield a good part of the state revenue. But if pushed recklessly, as too often in the past, they will not merely invite their own end, but will put a stop to the quest for recreation in the New Hampshire hills. Moderation, wise and foresighted lumbering, will preserve both the direct and the indirect sources of revenue, and time will contantly add to their amount.

All this, which applies to the pocketbook alone, is important enough to lead to wise action without further discussion. But there is a broader argument of general policy which may be used in defense of the New Hampshire forests. Recreation grounds in the East are limited. More and more, as the cities swell, and the pressure of industrial life becomes severer, it is of the highest common concern that nature be safeguarded and encouraged in her beneficient work of building up and sustaining the great world of Recreation, in which care is thrown aside and cramped limbs, bent shoulders, and weary brains may find freedom and invigoration. The forest for recreation has become a much needed investment in the interests of the whole community.

TELEPHONES AND THE FOREST RESERVE*

BY

BRISTOW ADAMS
Expert, U. S. Forest Service.

AMONG the newer and more unique uses of the telephone is one that has received Government sanction in connection with the administration of the Forest Reserves. The installation of telephone service in the national forests, where there is necessarily much isolation, is counted on not only to prove of great convenience to those engaged in the administration of these tracts, but also to save many thousands of dollars, and perhaps even many lives.

In the first case the telephone will serve the same uses as it does in the big agricultural stretches of the West, where it has been a potent factor in relieving the rancher and his family from the terrible nervous strain of an enforced isolation. It has even been claimed that insanity has decreased among farm women since the telephone has come into rural use. Then also the convenience in the transaction of general business between farmers, and with the general public has meant many reforms and the saving of incalculable time. These things being true in respect to rural districts, how much more are they true of the telephone in its relation to the forest reserves and the daily life and work of the forest ranger and his family absolutely isolated from their fellow beings, in some cases dwelling at least fifty miles from the nearest settlement, and twice that distance from the headquarters of the forest Supervisor whose consultation and advice is often needed. Then, too, the general public in or near forest reserves has to do business with reserve officers and the telephone in a moment can obviate the necessity of a day's journey, and a journey that may be, and often is, fraught with danger.

But it is in cases of emergency in the forest that the telephone becomes the instrument of salvation; and no greater emergency is likely to arise than that engendered by the most serious menace to the forest and to forest life—fire. The prevention and control of forest fires is the most important and the most difficult work that confronts the forest reserve force, since fires annually cause more loss than all other destructive agencies combined. Forest fires in the United States each year consume property to the value of one-tenth of the entire forest product of the country. Moreover this immense record of destruction takes into consideration only such immediate loss as may be calculated or approximated, and cannot measure permanent losses to the forest, and to the resources dependent upon it.

Forest fires, generally speaking, cannot be coped with after they have become fully started, and sweep over the country without meeting any resistance, destroying everything in their path and wiping out life and property. In brief, the only possible way to control fires is to prevent them, or reversing the recipe for rabbit pie, the idea is, not "first catch your fire," but "catch your fire first." In this catching of the fire in its inception, the telephone plays an important part. A single example will suffice: A forest ranger in the California mountains leaves his cabin in some secluded valley to take up his round over the part of the reserve under his immediate control. His trails are well kept, his telephone is in order, with call boxes

*Reprinted through courtesy of *The American Telephone Journal.*

arranged every few miles along the paths and fire lanes. He comes upon a place where a party of campers or prospectors have left their camp fire without stamping it out. In the interval between their departure and his arrival a ground fire in the dry forest carpet has become too large for him to cope with alone, though his efforts may be able to check it for a limited time, particularly in its most dangerous direction. In such a case he can remain to fight the fire to the best of his ability and hold it in check until help from the Supervisor, or other rangers with a suitable force, can arrive from a distance.

The picture is not so pleasant if it is drawn from an instance where the telephone system is lacking. A fire breaks out in a district remote from any help. The ranger may discover the blaze after it is beyond the control of a single man, and assistance must be secured before there can be any hope of effectively stopping it. But his district is a day's ride from a settlement, maybe two or three days' ride from the Supervisor's headquarters. There is a choice between the two courses of action, both of which are almost hopeless. He may try to hold his ground and work in utter futility to stop flames that readily get beyond his control. If he leaves at once for help, some days may elapse before he gets back with men and fire-fighting tools. During his absence the wind may have arisen and he returns with his force to find thousands of acres burned over, and the men at his command practically as powerless against the larger fire as he was against the incipient one.

These two contrasting cases will serve to show instances where the telephone would be valuable. Even a fire of some severity at the outset can be held in check by one man, especially if he is working, not with the idea of a hopeless task to be grappled with alone, but buoyed up with the certainty that he is to do his best until he gives way to a sure and effective relief. The mental attitudes under the two conditions must be considered as important factors, because a man will work harder, longer, and with less fatigue if he sees a relief or a reward ahead. It has been stated that the boy who held his hand in the dyke crevice through a long night's vigil could not have done so had he not been sure that dawn would bring the Holland villagers and relief. Without reflection on a ranger's courage and tenacity, it is safe to assume that he would be less likely to fight long and hard to combat a fire if he felt that the struggle were not only hopeless but endless.

The use of telephones on forest reserves is not a suppositional nor a merely contingent matter. They have been tried and proved by time, and although the Government has no telephone service of its own in operation, there is one under construction in the Big Horn Forest Reserve in Wyoming, where the first line will be 109 miles long, connecting the rangers' cabins in the reserve with the Supervisor's headquarters at Big Horn.

The preliminary work was done by an expert in telephone construction detailed from the United States Weather Bureau, and the material has been purchased. Actual construction was to have been begun in the spring, in order that the line might be available for the protection of the forest during the season when fires are most prevalent. It was held up until later, however, on account of the fact that the appropriation did not become available until the first of July. The construction cost, it is estimated, will average $30 per mile, or about $3,300. The total cost of supplies for the line, exclusive of instruments, which are to be leased from the Bell Telephone Company, amounted to $2,400 laid down at Big Horn, Wyo. The wire was obtained from Du Perow, of Washington, D. C., at a total cost of $1,897.50, and the insulators, brackets, and kindred equipment from the Electric Appliance Company of Chicago. The construction of still another telephone system was authorized under the Government, providing for

five miles of Government telephone lines on the Pikes Peak Forest Reserve in Colorado. Construction on this line was begun as soon as the appropriation became available at the beginning of the present fiscal year.

The comparatively low cost of such lines, owing to the presence of poles on the ground, and even the use of standing trees, is one of the things which will contribute to their extension.

Supplementing the proposed Government telephone lines are a number of private lines constructed under permit from the Forester, who grants a right of way across a forest reserve only on condition that the forest officers shall be allowed free use of the line for official business. So far there have been permits granted to nineteen individuals or companies for an aggregate of more than 140 miles of line, which may be used for the protection of the forests in several different localities.

Upon the success of the Government lines under construction will depend an extensive adoption of telephone systems on all reserves, though it is already established and understood that their use is attended with excellent results. It is probable that in winter these lines will suffer considerable damage, but as this is the time when there is likely to be no demand for their use no serious difficulties will be experienced. In the spring a few days' labor will put them in order.

The details to be considered in laying out these forest lines will vary more or less in different localities, but in general will be determined partially by the contour of the country, and perhaps to a larger extent by the location of trails used by the rangers or forest patrol. Wherever possible the line should be carried within a reasonable distance of high places in the reserve, which may be made to serve as lookout points from which the smoke from any fire may be quickly detected. The ranger thus provided with facilities for reporting the fire may not only make its presence known, but even in some cases cause a considerable force of men to approach it from the nearest point where they may be found, securing an immense advantage over the transmission of calls for assistance by messengers on foot or mounted on horseback. Although it is conceivable that each man might be equipped with a telephone box adapted to make connection with the line the practical conditions of forest patrol are such as to make it inadvisable for a ranger to be burdened with any unnecessary weight. This makes it desirable to provide call boxes at selected points along the line. It is far more easy for a man to walk a mile or two on the occasion when he does need to use the line than to be day after day weighted with a telephone box, ringer and batteries which will save only a few minutes of time.

If for no other reason than the use in connection with fire patrols, the telephone becomes a necessary adjunct to forestry, where there are large tracts of woodland. As the ease with which these forests may be reached by campers and sportmen is increased, owing to improvements in transportation facilities, it seems to be a regrettable fact that the risk of fire is much increased. This risk will grow larger as time goes on, and it seems desirable to take the most thorough precautions to diminish the danger which is known to exist. The use of the telephone seems to be not only an effective method of promoting such protection, but it is economical and admirably suited to the practical conditions of forestry. It is for these reasons that private holdings no less than public reserves should have their fire lanes, patrol trails and lookout points; they should have call boxes along the trails, and the rangers or patrolmen should be given instructions in the use of the telephone to get direct commun-

ication with mills, logging camps or points where a number of men can be had at once. Also by the use of telephone call stations a considerable saving can be made in salaries of patrolmen, because one man with direct tlephone communication can effectually cover a much larger area than could be looked after by several men without its aid.

The establishment of a fairly complete network of telephone lines over both the forests subject to government control and those owned by individuals and firms is extremely likely to make losses from fire very low.

FOREST PRODUCTS

BY

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THE annual yield of forest products in the United States reaches huge proportions, and it is only when we attempt to round out and properly estimate the various items that we get some comprehension of the important role the forests fill in the national economy.

A rough estimate of the quantity and value, in first hands, of the present yearly output of the forests runs as follows:

35 billion feet of lumber at $15 per M	$ 525,000,000
200 million cords of firewood at $2 per cord	400,000,000
75 million hewed crossties at 40cts	30,000,000
Cooperage stock	25,000,000
Lath and shingles	25,000,000
Turpentine and rosin	25,000,000
3 million cords of pulpwood at $5 per cord	15,000,000
1 million cords of tanbark at $5 per cord	5,000,000
Mine timbers, posts, piles and other products	50,000,000
Total	$1,100,000,000

These figures are upon investigations made by the Census and Forest Service, and there is a large chance for error in only one item, that, viz., of firewood. According to the estimates made by the Census in 1880, when the population numbered fifty millions, the annual consumption of wood for fuel was then one hundred and forty-six million cords; hence, despite the largely increased use of coal, it is considered fair to assume that the eighty-five million inhabitants of the United States, to-day, are using at least two hundred million cords of firewood.

It will be noted that lumber makes nearly one-half the total of the forest products, though in actual content it is probably not much over one-fourth of the annual wood cut. This is because lumber is, comparatively, a highly finished product, and, in addition to being made from the best trees, it contains a considerable amount of labor cost.

Rapid as has been the increase in population, the increase in lumber consumption has been still more rapid. In round numbers the lumber cut in 1880 was 18 billion feet, in 1890, 27 billion feet, and in 1900, 35 billion feet. The increase in population from 1880 to 1900 was 52 per cent, but the increase in lumber cut was 94 per cent.

According to the data so far collected the lumber cut in 1905 was not in excess of that of 1900. The indications are that the maximum output of forest products has been reached for the country as a whole, and that

before long there will be a marked decline in *quantity* accompanied by a corresponding increase in *value*.

The Census figures on the lumber cut in 1904, excluding custom mills, are as follows:

Kind	M. ft. B. M.	Per cent.
Yellow pine....	12,812,307	37.5
White pine.....	5,253,846	15.4
Hemlock	3,268,787	9.6
Red fir.....	2,929,534	8.6
Oak	2,902,855	8.5
Spruce	1,303,886	3.8
Poplar	853,554	2.5
Cypress	749,592	2.2
Maple	587,558	1.7
All others.....	3,473,220	10.2
Total.....	34,135,139	100.0

There was, within memory, a time when white pine alone constituted one-half of the lumber cut of the United States. The ratio fell to about 22 per cent in 1900, and to 15 per cent in 1905. Michigan has become a small factor in white pine production; Wisconsin is waning, and it will not be long until Minneapolis and Cloquet cease turning out daily a million and a half feet each during the sawing season.

Yellow pine is now furnishing about 35 per cent of our lumber, and red fir, about 13 per cent. The output of red fir is increasing rapidly since it was credited with only 5 per cent of the total out in 1900 and 8.6 per cent in 1904.

The following statement of the value of the products of the lumber industry in the lake states, at the last four decennial periods, is taken from Census reports:

State	Value			
	1870	1880	1890	1900
Wisconsin..	$15,131,000	$17,952,000	$60,966,000	$57,635,000
Michigan...	31,946,000	52,450,000	83,122,000	54,291,000
Minnesota..	4,299,000	7,366,000	25,075,000	43,585,000

From these figures the deduction is easily made that, since 1870, the average yearly value of the products of the lumber industry in these states has been $38,000,000, and that the years is over $1,300,000,000.

As before mentioned, we have probably reached the maximum annual cut, and the constantly growing demand for lumber can have only one effect, viz., rapidly rising price, particularly with the species which are nearest exhausted.

With a present annual yield of 5 billion feet, white pine, despite the boasts of its southern and western competitors, is still a large factor in the lumber market.

The rise in lumber prices is making possible a rational, economical treatment of our remaining forests. Under the practice common in many places, little more than 25 per cent of the total wood content of the tree goes into lumber. Tops, lops, crooked logs, and high stumps are left to burn or decay in the woods, and slabs, edgings, and trimmings are fed into the burner at the mill until it becomes a cloud of smoke by day and a pillar of fire by night.

Every part of a tree is intrinsically capable of utilization, and the time is rapidly approaching when it will be utilized. Not many lumbermen have yet come to the point of logging their holdings according to methods which will insure a future crop of timber, but the progress in this direction is encouraging and rapid advancement is being made in the utilization of the log. Methods of manufacture are be- is being lessened, slabs are cut thinner, odd lengths and widths are appearing, and new uses are being found for waste. It is the proud boast of the biggest mill in Minneapolis, and possibly the biggest in the United States, that it does not have a burner, and this example is worthy of imitation.

GREEN ASH (Fraxinus Lanceolata)*

XI.—Notes on Forest Trees Suitable for Planting in the United States

DISTRIBUTION AND MANNER OF OCCURRENCE.

The Green Ash is distributed over the greater part of the United States east of the Rocky Mountains, even extending into the mountains in Utah and New Mexico; to the northward it occurs as far as the Saskatchewan River in Canada. It is most abundant in the Mississippi basin, and is rather infrequent in the East. In the timber belts along the streams that drain the plains and prairie country of the middle West the Green Ash often occurs as the leading species, but in general, especially in the East, appears singly or in small groups among other hardwoods. The species most commonly found in such natural mixtures are the White Elm, Hackberry, Sycamore, Black Cherry, Red Ash, and Bur Oak.

CHARACTERISTICS OF FORM AND GROWTH.

The Green Ash is a medium-sized tree with a straight, undivided bole when forest grown, and slender spreading branches. A height of 80 feet and a diameter of 24 inches is rarely exceeded. Deep-seated fibrous roots, which extend laterally, form the characteristic root system. Because of the absence of vertical heart or tap roots, transplanting of seedlings is not difficult. The tree prefers full light, and is tolerant of moderate shade only.

In the arid or semi-arid regions the growth is not rapid. In the more humid sections the Green Ash compares favorably with other broad-leaved trees in rate of growth, although under no conditions is it a rapid grower. Under average conditions planted trees should make posts in fifteen to twenty years, and be large enough for stakes or fuel in less time. From measurements made in Nebraska it appears that the diameter accretion in that region is from 0.2 to 0.3 inch annually.

THE WOOD: ITS ECONOMIC USES.

The wood of the Green Ash is hard, heavy, and strong, rather coarse-grained, and brittle. It is utilized in the manufacture of agricultural implements, carriages, and furniture, and, although said to be inferior in quality, is substituted for White Ash to a large extent; the timber of the two species is often sold indiscriminately. The relative fuel value of the wood is high. Although not first-class for fence posts, it is used for this purpose extensively in the north central states, and is highly prizer in the many sections where more valuable species are not available.

SOIL AND SITE.

The Green Ash occurs naturally and is of best development on low, moist ground. It is said that the soils favorable to the best growth of the Green Ash are found on river bottoms and consist of slightly alkaline "gumbo." The tree is in general unusually tolerant of alkaline soils of any nature. Low swales at the foot of bluffs also produce good trees. The tree does not demand rich soil, but will thrive moderately well on a dry sandy loam, or on a stiff clay upland Its ability to persist and even thrive under adverse conditions of temperature and moisture is unsurpassed by any broad-leaved tree. It is reported to be one of the best trees for planting at Brandon, Manitoba, in latitude 50 degrees north, and will do equally well

*Data furnished by the U. S Forest Service.

on the dry plains and in the hot winds of New Mexico. On the arid plains of western Kansas and Nebraska it has survived on abandoned timber claims where nearly all other species have withered and died.

PROPAGATION.

Reproduction of the Green Ash is effected by seed and coppice growth. Propagation by seed is the best and only reliable method of artificial forest extension of the Green Ash. The seed may be purchased from dealers for 50 to 75 cents per pound, but wherever possible it is advisable for the local planter to gather his own supply. The several species of ash seeds are very similar in appearance, and the germination per cent low at best; hence it is advisable to send samples of purchased seed, or even home-gathered stock, to the Seed Laboratory of the United States Department of Agriculture, where all seeds will be identified and tested without charge.

Green Ash matures its fruit in early autumn. Collecting should be begun as soon as the seeds ripen. Stripping the seeds from the trees by hand is the most reliable method of collecting, since they do not fall early enough to sweep up from pavements and roadways. Fall planting may be practiced, but is in general inadvisable. The seeds may be kept over winter in a cool, dry place, or "stratified." If stored dry, the seed should be soaked in warm water for several hours before planting in the spring. If stratified, the winged seeds should be placed in boxes between alternating layers of slightly damp sand, and the boxes stored in a cool cellar. The vitality of the seeds can not well be preserved more than eight months.

Broadcast sowing of ash seeds on prepared or unprepared ground, or even planting the seed in hills where the trees are to stand, is generally an uncertain and unsatisfactory process, hence nursery culture is advised. The nursery and seed beds should be prepared on rich, well-worked ground, an old garden spot being an excellent site if the soil is not too full of weed seeds. Preliminary working of the ground should be as for a garden crop. Planting may begin in spring as soon as danger of frost is over. For convenience in weeding, it is recommended that the seed be sown in drills, 8 to 12 inches apart for hand cultivation, and 2 to 3 feet apart if a horse cultivator is to be used. The normal germination per cent is rather low, hence the seeds should be dropped thickly enough to touch each other in the row. They should be covered about one-half inch deep and the soil pressed down firmly by means of a roller, or pressure with a board. In the arid regions it is sometimes best to cover such seed 2 or 3 inches in depth until after germination is well started, after which the dry surface layer of soil should be raked off, leaving a covering a little less than a half inch in depth. A mulch of chaff, sawdust, or old hay, if kept moist and raked off when the sprouts begin to break the ground, will answer the same purpose. Uniform moisture conditions should be maintained if possible, whether by surface irrigation, sprinkling, or mulching.

The seedlings should attain a height of 6 to 10 inches the first season, and should be transplanted to the permanent forest site when 1 year old. Shading of the young seedlings is not essential. If purchased from nurseymen the cost is from $2 to $3 per thousand.

The Green Ash does not cast a heavy shade. It comes into leaf late in the spring and hence should not be planted alone, because in pure plantations the grasses are likely to thrive to the detriment of tree growth and prevent the formation of a desirable forest floor. Close planting (4 by 4 feet) in well-prepared soil is advisable on prairie soils, and wherever possible the ground should be cultivated between the trees until they spread out so as to form a complete ground cover. One

of the best trees for mixing with the Green Ash is the Hackberry. Other good species for such a mixture are Boxelder, White Elm, Scotch Pine, and Red Cedar. If grown in pure stands the Green Ash should be underplanted with Choke Cherry, Wild Black Currant, or Wild Plum. These shrubs will endure the shade and keep the ground free from grass and weeds.

ENEMIES.

Several insects are known to prey upon the Green Ash. In case injurious insects appear in alarming numbers upon natural or planted trees, specimens should be sent to the Division of Entomology, where they will be identified and measures suggested for their destruction or control. The chief climatic influence liable to injure the Green Ash is a protracted growing season, followed by a severe frost. Such injuries, however, are only temporary, and the tree soon recovers fully.

POSSIBILITIES AND USES.

The fairly rapid growth, easy propagation, and unsurpassed hardiness of the Green Ash make it one of the most valuable trees for general planting in the arid, treeless West. It serves a useful purpose, whether planted for windbreaks, ornament, or timber. The wood is believed to be inferior to that of White Ash and many other species, hence its propagation in humid regions is not recommended, but in sections where wood of any kind is of high value because of its scarcity, extensive general planting is advisable. The Green Ash should be planted in place of Cottonwood in many sections.

PLANTATIONS.

Although the Green Ash has been extensively planted in the middle West, figures based on examinations and measurements of well-established plantations are not available. Forest plantations of Green Ash throughout Kansas, Nebraska, Iowa, and South Dakota are, in general, in a very thriving condition.

THE EIGHT HOUR LAW

THE rigid enforcement of the Eight-hour law upon Government construction work during the present summer by the President, has created much disturbance among those concerned.

On account of the enormous amount of work of an engineering character being carried on throughout the country the demand for labor has far exceeded the supply and the large contractors have so much private work that they are not willing to take up Government work unless the conditions are unusually favorable.

Practically all the laborers prefer to work 10 hours, as they cannot get the same pay for 8 hours. The contractors are not willing to put their men who have regularly worked a 10-hour day upon Government work at 8 hours, as it demoralizes their forces and they cannot keep their well-trained men unless they pay one and one-quarter times as much for an 8-hour day on Government work as they do for 8 hours on private work. The contractors are therefore bidding at much higher rates on Government work than has heretofore been the rule. Therefore Government officers, especially those who are working on specific appropriations for a given piece of work, find themselves unable to prosecute it upon the plans which formed the basis of the appropriation by Congress. Likewise the contractors who have for many years been working for the Government on a ten-hour day and who are now doing work

on prices based upon the ten-hour day, are losing money, and in some cases are going into bankruptcy. Such works are consequently very much delayed and in some cases are at a standstill.

The newspapers reported only a few days ago that laborers on Government work on the Ohio River had gone on a strike, because they were cut down from 10 hours to 8 hours, presumably with a corresponding deduction in pay. In many cases the Government and contractors are compelled to give at least nine hours pay for eight hours work. Even then, on account of the great demand for labor, it is very difficult to get men, because they would rather work 10 hours in order to get the additional pay.

When labor is scarce the best laborers take only the better kinds of work and so we have the condition that on many works labor is more expensive, is harder to get, and is less efficient.

The result of the enforcement of the Eight-hour law must be a very large increase in the appropriations for work already authorized by the Government and in all future work.

It is certain that the work of the Government will hereafter cost from 10 to 20 per cent. more on all items of labor than in the past.

In the face of all this it is a fact that the laborers are more contented when working ten hours than when working eight, not only because they can earn more, but because on most construction work they are located at a distance from centers of population and there are no forms of occupation or amusement available during the non-working hours, except those of drinking, gambling, and the like, for which facilities are always supplied in the neighborhood of construction works by those who engage in business of that character. Although a large proportion of the workmen cannot resist the temptation offered by such resorts, yet many realize that the opportunity to save money is greatly diminished by an increase in the number of hours which are not devoted to labor.

This is practically true in all cases of out-door work, where the conditions are healthful as 10 hours work under such circumstances not an undue physical strain.

RECONNOISSANCE OF MARYLAND FORESTS

F. W. BESLEY, State Forester, is making a brief, general study of Maryland forest conditions—an investigation which will call him, in turn, to all the counties of the State. He has just made a preliminary examination of the Eastern Peninsula, especially of Wicomico County, in which he secured notes for the preparation of a forest map to be published in a report on forest conditions and possibilities. About 5 per cent. of Wicomico County is woodland.

Mr. Besley is immensely pleased with forest possibilities in that region. It is within the range of the loblolly pine, where abandoned fields grow up rapidly to this species and make, in a few years, an excellent stand. Such lands with a 10-year-old pine thicket upon them can be bought for about $10 per acre, and in 30 years they will be worth, at present prices, from $50 to $70 per acre for the timber alone. For a pine stand 40 years old one man has been offered $60 per acre for the timber alone. Timber of the same age and quality on a five-acre tract adjoining sold recently at the rate of $71 per acre. The risk of

loss by fire is so slight as to be practically eliminated, and, as a rule, the large tracts pay the taxes from the sale of cordwood in thinnings or in clearing small areas. There is a market for almost everything down to 2 inches, so that clean cutting can be practiced profitably, followed by clearing and 8 or 10 years of cultivation. At the end of that period the fertility stored up by the forest will have become exhausted and the field may be abandoned to another crop of pine. The best stands of pine invariably come up in the abondoned fields. On some of these cut-over lands the pine will succeed itself naturally, while on others seeding, planting, or some preparation of the soil is necessary to insure renewal of the pine. Mr. Besley also made a hurried trip through the western part of the State. In Garrett County, he visited the tract, aggregating about 4,000 acres, which Mr. Garrett will present to the State for forest reserve purposes. A good opportunity is here offered for examples of forest management, for the region is frequented by tourists and sportsmen, and one tract of 400 acres is only 2 miles from Oakland, the county seat. Part of the forest has been burned over, other portions cut over recently, and other portions in heavy forest, so that different forms of management can be well shown.

There is in the western part of Garrett County one of the few virgin stands of hemlock. This tract contains about 75 acres, mostly hemlock, and will run about 25,000 board feet per acre. The associated species are white and red oak, of which there are some fine specimens. The greatest service forestry can do in the mountains of Maryland is to provide protection from fire. There are ample forest fire laws, and it is hoped that a good, healthy sentiment will be created for their enforcement.

The establishment of seed beds at the Maryland Agricultural College is contemplated, both for illustration of the best forest nursery practice in connection with the course of lectures before the students, and to obtain stock for planting on open places on the reserve.

Mr. Besley stopped at Rockville to inspect the grounds of the prospective plantation of Mr. Earle. Mr. Earle has about 5,000 white pine seedlings in nursery rows, which he intends transplanting to a permanent site next spring or the spring following. This experiment will be watched with interest to determine the adaptability of white pine for commercial planting outside the mountain counties of the State.

Government Irrigation Work During the Month

Begin Roosevelt Dam

"The first stone of the Roosevelt dam was laid by the contractor at 5 o'clock on the afternoon of September 20."

This message, from Engineer Hill, was read with a great deal of satisfaction by the officials of the Reclamation Service. It marks the beginning of the end of one of the most daring and difficult irrigation projects so far undertaken by the Government.

The contract for the construction of this dam was executed by the Secretary of the Interior April 21, 1905. Although the company which made this contract is energetic and experienced, the long succession of unusual floods which have occurred in Salt River in the past year has from time to time delayed the attempts to control the river with coffer dams and excavate the foundation. Time after time a large amount of work has been entirely destroyed and the contractors' appliances swept away.

It is, threfore, with a great sense of relief that the news is received that the erratic river has finally submitted to the curb and rein and a few weeks will see the contractors' works out of danger. The work will thereafter advance rapidly and benefits from the storage accomplished may be expected during the season of 1907, although the completion of the dam will require a much longer time. The dam will be 284 feet high, 280 feet long at the base and 700 feet long on top. It will back the water up for 25 miles, forming a lake with a capacity of 1,300,000 acre-feet, or water sufficient to cover that many acres one foot in depth. The cement mill erected by the Government has a capacity of 350 barrels a day and the saw mill thirty miles up the canyon has cut about 3,000,000 feet B. M. of lumber for use in the various structures. A power canal, 18 miles long, with a drop of 220 feet, is furnishing power to operate the cement mill and for use in constructing the dam.

When completed this project will reclaim more than 200,000 acres of desert land.

Work Moves Rapidly

The Secretary of the Interior has awarded contract to the Pacific Portland Cement Company for supplying 27,000 barrels, more or less, of Portland cement for the Tieton and Sunnyside irrigation projects, Washington.

Four proposals were received for furnishing this cement, but taking into consideration the cost of transportation, that of the Pacific Portland Cement Company, Tolenas, California, was the lowest.

This marks the beginning of the construction work on the Yakima project, of which the Sunnyside and Tieton projects are independent units. The Yakima irrigation system, as planned by the Reclamation Service, will ultimately be one of the largest of the Government projects.

The nucleus of irrigation already established in this valley has shown that in fertility of soil and climatic condi-

tions this portion of Washington compares favorably with the best irrigated sections in the West.

The people have been very energetic in clearing away some of the preliminary difficulties encountered by the Government in starting the work, and the conditions are very favorable for a large increase in the irrigated area in the next few years.

Plans and specifications for the canyon portion of the main canal, Tieton project, were completed in July, and bids for its construction will be opened November 15th. A field party is now engaged in the location of valley portions of the main canal. A wagon road is under construction up Tieton canyon to facilitate operations along that portion of the canal, and every effort will be made to complete the road and have everything in readiness for the actual commencement of canal construction next spring. A farm unit survey has been completed and plans for the distribution system are being studied and prepared.

The development of the distribution system of the first unit of Sunnyside project is now occupying the engineers, and plans and specifications are about completed for a concrete weir to replace the movable dam at the head of the Sunnyside canal.

Umatilla Work

The Board of Consulting Engineers recently convened at Portland, Oregon, to open bids for the construction of main canal and laterals of the distributing system, Umatilla irrigation project, Oregon, received seven proposals, which were transmitted to the Department for action.

Salt River Canyon, Arizona, Looking Down Stream from Point About Half Mile Above Dam Site.

The work is divided in two schedules, and the Secretary of the Interior to-day awarded contract for schedule 1, consisting of about 15 miles of main and lateral ditches, to Thomas Jaques, of Pilot Rock, Oregon. Mr. Jaques' bid was $20,212.50

All bids on schedule 2, which consists of 26 miles of main canal and laterals, were rejected on the ground

that they were unreasonably high. The Secretary of the Interior authorized the Reclamation Service to prosecute the work by force account. Horses for this work will be shipped from the Klamath irrigation project in the southern part of Oregon, as their use at the latter place is not needed during the winter.

Contract for Pumps

The Secretary of the Interior has executed a contract with the D'Olier Engineering Company, of Philadelphia, for furnishing and installing pumping machinery for the Buford-Trenton irrigation project, North Dakota.

The contract calls for the installation of three transformers of 300 kilowatt capacity, and eight motor-driven pumping units of capacities of 16 and 30 cubic feet per second under heads of 50 and 33 feet respectively, with necessary electrical apparatus and water pipes, in pumping stations near Buford, North Dakota. The D'Olier Engineering Company will receive $40,836 for the work.

Now that the contract is let and the exact dimensions of the machinery are known, the engineers will determine on the design of the floating barge in which the intake pumps are to be mounted, and labor and material will be secured for the construction of the barge.

The water supply for this project is from the Missouri River, the slight gradient of which necessitates lifting the water direct from the stream by pumps. No long and expensive canal system will be required. An abundance of lignite fuel exists in the vicinity and it is proposed to generate power at the mines and transmit it electrically to the several pumping stations for the Buford-Trenton ad Williston projects. The first pumps will be placed on floating barges. These will, of course, accommodate themselves to changes not only in water level, but to the shifting of the stream, the water being conducted from the pumps on the barges through pipes with flexible joints, to the main canal. Additional sub-station lifts will be introduced wherever required.

Yellowstone Project

The Secretary of the Interior has executed a contract with the Pacific Coast Construction Company, of Portland, Oregon, for the construction and completion of the Yellowstone dam and accessory structures, Lower Yellowstone irrigation project, Montana and North Dakota.

This dam is to be a rock-filled, timber-cribbed structure, located about 18 miles northeast of Glendive, Montana, for the purpose of diverting the waters of Yellowstone into a canal extending about 80 miles down the west side of the river for the irrigation of 67,000 acres of land, two-thirds of which lie in Montana.

The work requires about 500,000 feet of lumber, 700 piles, 1,600 sheet piles, 11,000 cubic yards of rock filling and rip-rap, and 80 tons of steel.

The contracting company will receive $142,825 for its work, which, according to the terms of the contract, must be completed February 1, 1909.

Belle Fourche Project

The engineers in charge of the Belle Fourche irrigation project, South Dakota, are rushing work all along the line, as freezing weather will soon force suspension of operations till spring.

The Chicago & Northwestern Railway Company has made surveys preliminary to connecting their main line with the Government town site.

There is great difficulty in procuring a sufficient force of laborers, and the contractors are put to great expense by being obliged to continually ship in men from Cuba, Denver, and other centers in order to keep the necessary number of men on hand to carry on the work. The contractors are paying from $2.50 to $2.75 per day for common labor, and the Government pays $2.20 for eight hours work.

Authority has been granted for the construction of three miles of canal inside the Belle Fourche Reservoir to connect the Inlet canal by way of Dry

Gunnison Tunnel Work

During the month of September 719 feet were added to the excavated portion of the Gunnison Tunnel, Uncompahgre irrigation project, Colorado, making a total of 16,031 feet. The progress during the last two months has not been quite up to the usual standard on this tunnel, on account of the extreme harness of the quartzite rock in one heading and the friable and dangerous nature of the material in the other heading. The work has reached points so far from the portals that the difficulties in ventilation and tramming have increased.

Severe storms during the month delayed work on the South Canal and caused a loss to the contractor of approximately $1,000.

The scarcity of labor throughout the West is being severely felt on this project in all lines of work, both contract and force account.

Creek, with the constructed portion of the South Canal, so that water can be delivered to lands under this canal next spring. The engineers believe the work will have reached a point where water can be delivered to about 10,000 acres next season.

Progress on North Platte

The Secretary of the Interior is asking for proposals for the construction of a diversion dam and headworks on the North Platte River in Nebraska, in connection with the North Platte irrigation project, Nebraska-Wyoming.

The work will involve the excavation of about 100,000 cubic yards of earth and rock, furnishing and placing in structures about 10,000 feet B. M. of lumber, and the construction of about 8,000 cubic yards of concrete masonry. The bids will be opened in Mitchell, Nebraska, November first.

Work on the North Platte project has progressed rapidly during the season. The first forty-five miles of the Interstate canal has been furnishing water at several places for irrigation, but prepartaions for receiving it were incomplete and full use of the canal will not be made until next season The second section of the canal is under construction and surveys for the third fifty miles are being made. Contracts have been awarded on fourteen schedules of the distributing system and the work on the laterals is already in progress. The Pathfinder dam is progressing favorably and it is expected that about 15,000 cubic yards of masonry will be laid before cold weather forces suspension of work.

It is hoped that water can be delivered to about 40,000 acres under this project during 1907.

Contracts Let

The Secretary of the Interior has executed a contract with the General Electric Compan, of Schenectady, New York, for furnishing material and machinery for the electric generating plant of the power and pumping system, Williston irrigation project, North Dakota. This work will cost the Government $41,242.

The operation of the pumping machinery in North Dakota will be watched with great interest by the people in many sections of the West where the Reclamation Service has located large areas above the line of gravity supply. The power for the Williston and Buford-Trenton projects will be generated at the lignite mines in the vicinity of Williston, and transmitted electrically to the several pumping stations of the two projects.

The Secretary of the Interior also executed a contract with John H. Donohue, of St. Paul, Minnesota, providing for the construction and completion of building for Station 1, power and pumping system, Williston irrigation project, North Dakota. The estimated cost of the work will be $13,886.

A contract has been awarded to the Kansas Portland Cement Company,

of Iola, Kansas, for furnishing 5,000 barrels of Portland cement for the Garden City irrigation project, in western Kansas.

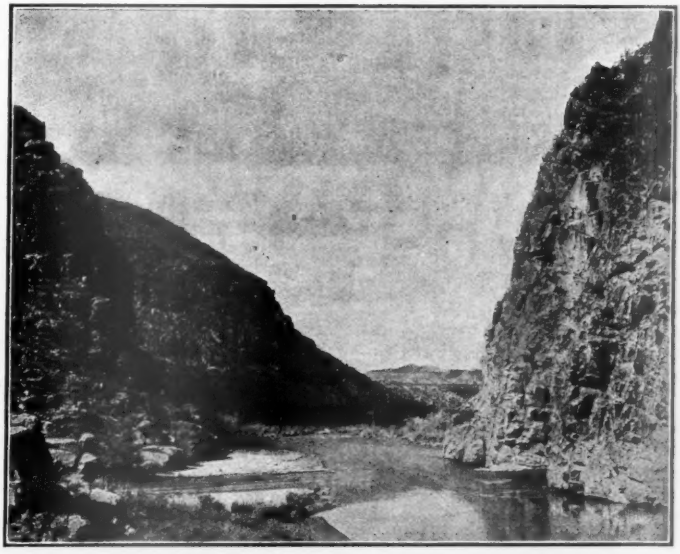
The bid of the above named company, at $1.60 per barrel, f.o.b., cars at Iola, was the lowest received, transportation considered.

Another contract is that with Marcus E. Getter, of Mitchell, Nebraska, for the construction of ten miles of earthwork, distributing system, Interstate canal, North Platte irrigation project, Nebraska. Mr. Getter's bid was $5,649.

The bid of Flower & Twing, of Morrill, Nebraska, for the work provided for in Schedule 4, earthwork of distributing systems, North Platte irrigation project, Nebraska, has been accepted. The bid for this work was $11,711, and the contract calls for the earthwork on about ten miles of lateral.

Bids Rejected

The Secretary of the Interior has rejected all bids received for the construction of structures for the Garden City irrigation project, Kansas,



Canyon Above Reservoir Site, Salt River, Arizona, Looking Down-stream

Henry C. DeLaney, of Williston, North Dakota, has secured the contract for the construction and completion of canals and structures under the Williston irrigation project, North Dakota. The work involves the excavation of about 220,000 cubic yards of earth, and furnishing labor and material for various structures requiring about 40,000 feet B. M. of lumber, and 1,000 cubic yards of concrete. Mr. DeLaney's bid was $81,867.

and authorized the construction of the work by force account under the direction of the Reclamation Service.

The work consists of the construction of deep and shallow wells, suction pipes, pumping stations, siphons, concrete-lined conduits, and fencing.

The bids were all greatly in excess of the estimates of the engineers, except one bid for a gate valve, and it is believed that the work can be more

economically performed by force account.

The Secretary of the Interior has rejected the bid of Henry C. DeLaney, of Williston, North Dakota, in the sum of $166,289 for the construction of canals, ditches and structures under the Buford-Trenton irrigation project, North Dakota.

The work involves the excavation of about 410,000 cubic yards of earth, and furnishing labor and material for a pumping station and various structures requiring about 140,000 feet B. M. lumber, about 2,000 cubic yards of concrete, and about 25,000 pounds of structural steel.

Mr. DeLaney's bid was the only one received, and was rejected as unreasonably high.

The Month in Government Forest Work

Personal Notes

Mr. Gifford Pinchot, Forester, returned on Thursday, October 11, from an extended western tour. While away, he attended the Irrigation Congress at Boise City, Idaho.

At this Congress, Hon. Weldon Brinton Heyburn, junior Senator from Idaho, took strong ground against the policy of forest reserves, asserting, among other things, that forests exert no influence upon stream flow.

Mr. Pinchot's advocacy of the policy in question was, however, supported by numerous other speakers.

Leaving Boise City, Mr. Pinchot visited the Big Horn and Yellowstone reserves, returning thence to Washington some weeks earlier than had been expected.

Mr. Herbert A. Smith, Editor, recently spoke before the Kentucky State Development Association, at Winchester. His subject was, "Forest Resources of Kentucky."

As this publication goes to press, Mr. George W. Woodruff, of the Division of Law, leaves for Lexington, Kentucky, to address, on Oct. 23d, the meeting of the State Bureau of Labor, Agriculture, and Statistics. He is also to speak at the annual meeting of the American Civic Association, at Milwaukee, Wis., on Oct. 26th, on the Appalachian reserve.

Mr. J. M. McVean, of the Division of Law, has for some weeks been engaged in a tour of inspection of some of the western forest reserves.

Forest Extension Work

Mr. E. A. Sterling, Chief of the Division of Forest Extension, returned to Washington, Oct. 12th, from an extended inspection trip through the West. In the course of this trip Mr. Sterling visited the planting stations in the San Gabriel, Santa Barbara, Salt Lake, Pikes Peak, and Dismal River reserves, and attended supervisors' meetings at Boise and Portland; in connection with city water shed and rangers' nursery work, he also visited other reserves in Idaho, Wyoming, Montana and Arizona. He started a nursery establishment in

the Pocatello reserve as a part of the city water shed project for the city of Pocatello. Another good city water shed proposition, benefitting Logan, Ogden, and Provo, he also located in the Uintah reserve. He reports that planting is needed for the benefit of the Santa Fe and Los Vegas water sheds and for the Jemez and Pecos River regions.

Rangers' nurseries are proving very popular. Supervisors and Rangers are, in most cases, anxious for them, and representatives of the Forest Extension work have been helping start one or two in each reserve to serve as models.

Conditions at Halsey, Neb., Mr. Sterling reports to be good. Last spring's plantation is looking well, and about 4,000,000 seedlings are in the nursery.

Examination of Lands

Prof. George L. Clothier, representing the Division of Law, has been investigating claims for land alleged to be agricultural, in the Bitter Root Forest reserve in Montana. He has spent about six weeks in that vicinity. He finds that the Bitter Root Valley is one of the best fruit countries of the west, apples in particular attaining a high degree of perfection in that region. Under irrigation, a good apple orchard will probably bring a fair rate of interest on an investment of $500 per acre.

Prof. Clothier reports the existence of large areas of land available for fruit raising, provided only adequate water supply were in sight. Still larger areas, however, are probably permanently incapable of irrigation.

On the Bitter Root Mountains is found some of the finest yellow pine of the Northwest, worth, on the stump, from $60 to $100 per acre. Wherever titles to timber land can be obtained the lands are rapidly snapped up by speculators.

A few days ago Prof. Clothier returned to Washington and made his report to the Forester. From here he goes to the Mississippi Agricultural College to resume the teaching of forestry.

Examining Mineral Lands

On August 20th Judge A. C. Shaw, of the Division of Law, left Washington for the Plumas Forest reserve, at Quincy, Cal. There he was joined by Mr. E. C. Finney, Law Examiner of the General Land Office, and L. G. Gillette, J. A. Dorsey, and W. L. Walker, trained geologists from the Geological Survey.

With the assistance of the Forest Supervisor, L. A. Barrett, this party established a camp in the reserve at Shoofly; and under the direction of both departments, Agriculture and Interior, instituted an investigation on the ground to determine the mineral or non-mineral character of certain alleged mineral land locations in that reserve. The evidence gathered will be made the basis of a hearing before the Land Office, at which the validity and legality of these mining locations will be tested.

From Shoofly, the party went, about Sept. 24th, to Santa Barbara, Cal. The camp was moved from place to place. Leaving the geologists on the ground to complete their investigations, Mr. Finney returned to Washington, while Judge Shaw went to the Santa Barbara reserve to investigate a condition alleged to be similar to the one above described. From Santa Barbara he went next to the Wichita reserve in Oklahoma, returning from there to Washington, Oct. 7th.

Reserve Administration

Mr. Findley Burns, of the Division of Publication and Education, who devoted a number of weeks in the past summer to visiting reserves, returned with a very encouraging report. The loyalty of rangers, assistant rangers and guards to the Forest Service he regards as especially noteworthy. Working at salaries very moderate, and often much below what they have

received elsewhere, they manifest an *esprit de corps* and a devotion to their tasks worthy of the veterans of Valley Forge or of the soldiers who followed the flag of the Man of Destiny. A partial explanation for this mental attitude is found in the degree of authority and the opportunity for practical administrative work enjoyed by these men. Rangers and assistant rangers are frequently men who have received training either in the Forest Service or in forest schools. Guards, however, are usually local men who have entered the service temporarily and, later, taken the Civil Service examination and become enrolled as permanent employees.

In some respects, the positions on the reserves are disappointing to the men, as many of them had expected situations similar to those of the Canadian mounted police. Instead, the work is hard and trying in the extreme. One ranger, for example, finds himself in a region too rough to permit the use of a horse; yet he must care for the interests of the reserve, not only by visiting its remote limits, but by scaling every log sawed at the mill. Schools are non-existent in this region; for this and other reasons this man finds it impracticable to bring his family to the reserve. He has earned as high as $115 per month in the Secret Service, and probably from $5 to $8 per day and expenses as a guide; yet he serves the Forest Service for $75 per month.

The reserve force workers are rapidly attaining a high degree of efficiency. Reserve inspectors, many of whom have had experience in the office of the Forest Service, are training and disciplining the force and bringing it into effective shape.

Happily, the fire fiend, the most lawless and deadly foe of the forest, is being in a wonderful degree brought under control by the reserve administrators. Prevention is the end most earnestly sought; with what success may be inferred from Mr. Burn's statement that, on the vast majority of reserves, the damage from fire has now been reduced to virtually nothing. The piling of brush by cutters of timber is insisted upon; in practically all cases the brush thus piled is burned by the reserve people, and under supervision so careful that the risk of damage is reduced practically to zero.

Sylvicultural Studies

During recent months Mr. Albert Gaskill, of the Division of Publication and Education, has visited a number of western reserves, in order to locate permanent sample plots on which, through the course of years, the sylvical characteristics of important trees may be accurately studied and recorded. In this way it is hoped that the knowledge of the sylviculture of these trees, which is at present defective or based upon foreign sources, may be supplemented by the knowledge of American conditions thus recorded.

Goes to Yale

Mr. R. C. Bryant, for some time in charge of the co-operative work of the office of Forest Extension, has recently resigned to assist in organizing the work in connection with the chair of practical forestry and lumbering, at the Yale Forest School. This chair, it will be remembered, was established by subscriptions from leading lumbermen throughout the country.

FORESTER AND DIRECTOR OF CENSUS WILL COOPERATE IN COLLECTION OF ANNUAL STATISTICS OF FOREST PRODUCTS.

LAST year the Forest Service undertook to gather statistics of forest products, with the purpose of publishing, annually, data to show as closely as possible the drain upon the forests. In this work it had the cooperation of the National Lumber Manufacturers' Association and, as regards timber used in mines, also that of the U. S. Geological Survey. In this manner statistics were gathered on lumber, shingles, lath, pulpwood, slack and tight cooperage stock, veneer, tanbark, railroad ties, wood used in mines, and wood used for distillation. Recently an agreement has been made between the Chief of the Forest Service and the Director of the Census, Department of Commerce and Labor, by which these two bureaus will together collect and handle the data in the manner described below.

The Bureau of the Census takes a census of the manufactures of the United States every fifth year, and of agriculture every tenth year. Statistics of forest products are included in these censuses so far as represented by the products of timber camps, sawmills and pulp mills. Information upon the consumption of these and other forest products is essential to the work of the Forest Service and it has organized a system of collecting the data annually. Every fifth year, the work of the two bureaus will be a duplication, causing unnecessary expense to the Government and annoyance to the manufacturer who will receive two requests for the same information. The Bureau of the Census, through its general knowledge of statistics and its excellent equipment for tabulating reports and computing results, is better fitted than the Forest Service to handle this part of the work. The Forest Service, through its technical knowledge of wood-producing and wood-using industries, is in a position to advise concerning the kind of information to be obtained, the interpretation of reports, and the form of presentation of results. Therefore, the Director of the Census and the Chief of the Forest Service mutually agree as follows:

1. In conformity with the letter of the Secretary of Agriculture of August 31, and the reply of the Secretary of Commerce and Labor, dated September 25, the Bureau of the Census and the Forest Service will co-operate in the collection of annual statistics of forest products, beginning with the year 1906.

2. The collection of the annual statistics will be done chiefly by correspondence, and as far as possible in co-operation with associations of lumber manufacturers. The letters transmitting the schedules shall be over the joint signature of the Director of the Census and the Forester and shall explain the joint arrangement under which the work is carried on. Subsequent routine correspondence in connection with the work will be over the signature of the Chief Statistician for Manufactures of the Census Bureau. The Forest Service shall also have the right to carry on correspondence in cases where such action will increase the efficiency of the work. All data will be tabulated by the Bureau of the Census. In cases where satisfactory returns cannot be secured by correspondence, or when other reasons it may be necessary to engage in field work, such work shall be done

by representatives of the Forest Service at the expense of the Service.

3. The schedules used in the collection of data shall be in the joint name of the Bureau of the Census and the Forest Service. For the years covered by the quinquennial census of manufactures, the regular census schedule shall carry the inquiries covered by the schedule for the statistics of forest products, the work being made part of the regular census of manufactures; the results, however, to be tabulated separately as soon as obtained and placed at the disposal of the Forest Service.

4. Immediately upon completing the statistics for each year, the results shall be printed in bulletins by the Bureau of the Census in which the joint arrangement between the two bureaus shall be referred to and proper credit given to the Forest Service. The reports from the manufacturers shall be available for the information of the Forest Service as soon as obtained.

5. The Forest Service shall turn over to the Bureau of the Census copies of all lists of names and addresses of producers and consumers of forest products that have been compiled in connection with this work. The Forest Service shall have the right to keep in its possession such lists of names corrected by the Census lists to be used for the mailing of its publications and other matters connected with its regular work.

6. A member of the Forest Service designated by the Forester will be appointed Expert Special Agent of the Bureau of the Census. The Expert Special Agent will determine the kind and amount of data to be collected, and the time of sending out the schedules. He will give technical advice whenever necessary for the interpretation of reports and will prepare the text of resulting publications. The Chief Statistician for Manufactures of the Bureau of the Census will decide all questions of tabulation and computation which do not involve a technical knowledge of the industry concerned. In case of disagreement between the Expert Special Agent and the Chief Statistician of Manufactures, the matter shall be referred to the Director of the Census and the Forester. The salaries and expenses of the Expert Special Agent and any other technical foresters who may be assigned to the work will be paid by the Forest Service. All other expenses will be borne by the Bureau of the Census.

CAUSES UNDERLYING THE LIMITED PRODUCTION OF CREOSOTE IN THE UNITED STATES

IN 1903 the United States produced 62,964,400 gallons of coal tar, with a gross value of $2,199,970—or a value per gallon of $0.0349. In 1904 the production was increased to 69,498,085 gallons. The gross value, however, declined to 2,114,421 dollars, making the value per gallon only $0.0304. Of this coal tar produced in 1904, 41,726,970 gallons came from gas works, and 27,771,115 gallons, from coke ovens. About one-half of the gasworks product is distilled, the other half being used as paving materials and for other local purposes. Practically all the coal tar from the "by-product" coke ovens is distilled; from the "bee-hive" coke ovens, however, little or no coal tar is collected. The creosote distilled from all sources in the United States in 1903 amounted to about 4,000,000 gallons. In the same year 3,711,565 gallons were imported from Germany and England. In 1904 the domestic product had risen to 4,863,400 gallons, while the amount

of imported oil had risen only to 3,783,472 gallons.

Statistics for 1905 and for the present year are not available, but it is certain that, although the production has considerably increased, it has altogether failed to keep pace with the demand, which, on account of the great activity now existing in wood preservation in this country, has made enormous advances. The restriction of the American production of creosote in the past has been largely due to the economic conditions which have resulted in an extensive rather than an intensive operation of all industries. No restriction had been placed on the private exploitation of natural resources far beyond the present needs; and with the development of effective machinery the inevitable result has been a rapacious, non-intensive exploitation accompanied by prodigious waste. Just as greater profits have been secured from cutting all merchantable timber in one operation and then investing the proceeds in new stumpage rather than in the practice of conservative forestry, so, unless the creosote were sold at a price which, in consideration of the cheapness of untreated timber, the consumer could not afford to pay, greater returns have been obtained by making investments in new coke ovens rather than in plants for the collection and distillation of the tar. The universal tendency of private enterprise always to seek personal and immediate profit rather than the ultimate national good, or even greater ultimate personal profit at the sacrifice of present gain, has received in the last half century a worldwide emphasis by the unprecedented commercial activity of the period, which, in the United States, has been particularly strong. To treat a railroad tie with 12 pounds of creosote per cubic foot costs about 45 cents, if the creosote can be obtained for about 8 cents per gallon. Even although railroad managers themselves may be convinced of the ultimate economy afforded by the preservative treatment of the ties, the stockholders will, under present conditions, rarely permit so large an increase in the current expenses of maintenance. Notable advances, however, are being made. In 1905 approximately ten per cent. of the ties laid throughout the United States has received preservative treatment. The larger portion were treated with zinc chlorid at a cost of about 16 cents per tie; whereas, if creosote had been used, a reduction in the annual cost of the treated ties could doubtless have been secured in most situations. The conservative distrust of all innovations was also, in this case, strengthened by the fraudulent treatments given during the introductory stages of the industry, either by insufficient penetration, by methods injurious to the timber, or by the use of cheap and ineffective adulterants. The large demand in the United States for soft pitch for roofing has also tended to retard a movement towards the oils of better and heavier grades. On the other hand, there is no considerable market in America for hard pitch, whereas the large demand in Europe permits the distillation of the heavier oils.

The cheapness of lumber, and the ease with which it could be obtained in any quantity, have also tended to delay the introduction of conservative methods. With apparently inexhaustible forests, and a mechanical perfection in their exploitation which has been unequalled elsewhere in the world, lumber has hitherto been too plentiful and cheap to necessitate its artificial preservation. The same causes which have brought about an enormous consumption of wood in America have also tended to discourage wood preservation as being unnecessary and impracticable. This tendency has been emphasized by the high cost of American labor as compared with that of Europe. These conditions, however, are rapidly changing. The lumber prices in the United States have advanced in the last ten years from 50 to 100 per cent., and the rate of increase shows no present signs of slackening. The sup-

posedly inexhaustible supply has dwindled to so small and definite a quantity that the large timber-using industries especially are becoming concerned for the future. Economic conditions also are rapidly becoming more stable, and for almost the first time the industrial world is now able to consider the future. There is, in consequence, a marked increase in wood preservation, and this is particularly true of creosoting But notwithstanding these facts, the production of creosote has so far failed to keep pace with the growing demand that contracts have already been given for the domestic production of the next two years; and it is certain that the amount now imported considerably exceeds that produced in the United States.

Utilization of Tupelo. Circular No. 40, U. S. Forest Service. By H. B. Holroyd; 16 pp.; illustrated. Government Printing Office, 1906.

It is only recently that the long, deep-rooted prejudice against tupelo has been proven unfounded, and, its value when handled in the manner suitable to its peculiar character, demonstrated beyond a doubt. The unfavorable attitude of lumber users to the wood has been largely caused by improper methods of handling. The bulletin mentioned here contains much additional information as to the best methods of preparing it for market, particularly as regards seasoning, in which, heretofore, the greatest difficulties were encountered.

Journal of the New York Botanical Garden. August, 1906; 20 pp.; illustrated. Lancaster, Pa., 1906.

The August *Journal* contains an interesting account of Prof. William R. Maxon's botanical collecting trip in Costa Rica, and an account of work done at the tropical station of the Garden, at Jamaica, together with notes and comment of interest to botanists and students.

Indian Forester. July, 1906. Vol. XXXII., No. 7. 391 pp.; illustrated. Pioneer Press, Allahabad, India.

Much insight into Indian forest methods is to be gleaned from the July issue of this valuable periodical. To American foresters the article on "Working Plans for Cantonment Forests" is interesting, and the descriptions of "rest-houses," built for the accommodation of forest officials in their tours of inspection, also contains much of interest to American forest officers.

Sub Surface Drainage of Land by Tile. Reprint from "Michigan Engineer." By Robert E. Horton.

Mr. Horton's exposition of this subject is presented with a large amount of valuable data, together with suggestions of a practical nature, and, in addition, the technical features of land drainage, forming in all a very interesting pamphlet.

Journal of the Western Society of Engineers. Vol. XI., No. 4; August, 1906. Chicago.

The August *Journal* contains a number of articles of more than usual interest, chief among which is Mr. M. O. Leighton's paper on High Pressure Sluicing Gates. Mr. Leighton is a prominent engineer in the Reclamation Service, in charge of the hydio-economic investigations of the Service, and the material presented in his paper is the result of considerable study and experience, with interesting data regarding some of the plans approved for the recent irrigation projects of the government Mr. L. E. Ashbaugh contributes an interesting paper on "The Assessment of Drainage Districts."

The *Journal* includes the papers read at meetings of the Society, together with such discussion as they may have evoked at the time of presentation. In the case of Mr. Ashbaugh's article, the discussion includes some interesting experiences of members in the same line.

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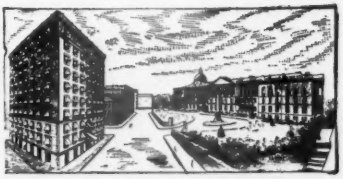

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DEPARTMENT OF THE INTERIOR, United States Geological Survey, Reclamation Service, Washington, D. C., October 1, 1906. Sealed proposals will be received at the office of the United States Reclamation Service, Mitchell, Neb., until 10 o'clock a. m., November 1, 1906, for the construction of a diversion dam and headworks involving the excavation of about 100,000 yards of earth and rock, furnishing and placing in structures about 10,000 feet, B. M., of lumber, and the construction of about 8,000 cubic yards of concrete masonry in connection with the North Platte Project, Nebraska. Particulars may be obtained from the Chief Engineer, United States Reclamation Service, Washington, D. C., or from John E. Field, Project Engineer, Mitchell, Nebraska. THOS. RYAN, Acting Secretary.

DEPARTMENT OF THE INTERIOR, United States Geological Survey, Reclamation Service, Washington. D. C., October 11, 1906. Sealed proposals will be received at the office of the United States Reclamation Service, Las Cruces, N. Mex., until 3 o'clock p. m., November 1, 1906, for furnishing 2,500 barrels of Portland cement, f. o. b. cars at manufacturer's shipping point. Particulars may be obtained by application to the Chief Engineer of the Reclamation Service, Washington, D. C., or to the Supervising Engineer, El Paso, Tex. THOS. RYAN, Acting Secretary.

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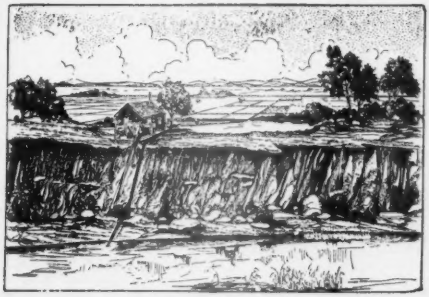

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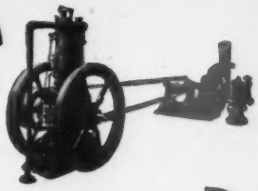

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